

SCIENCE

[Entered at the Post-Office of New York, N. Y., as Second-Class Matter.]

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

SEVENTH YEAR.
VOL. XIV. No. 353.

NEW YORK, NOVEMBER 8, 1889.

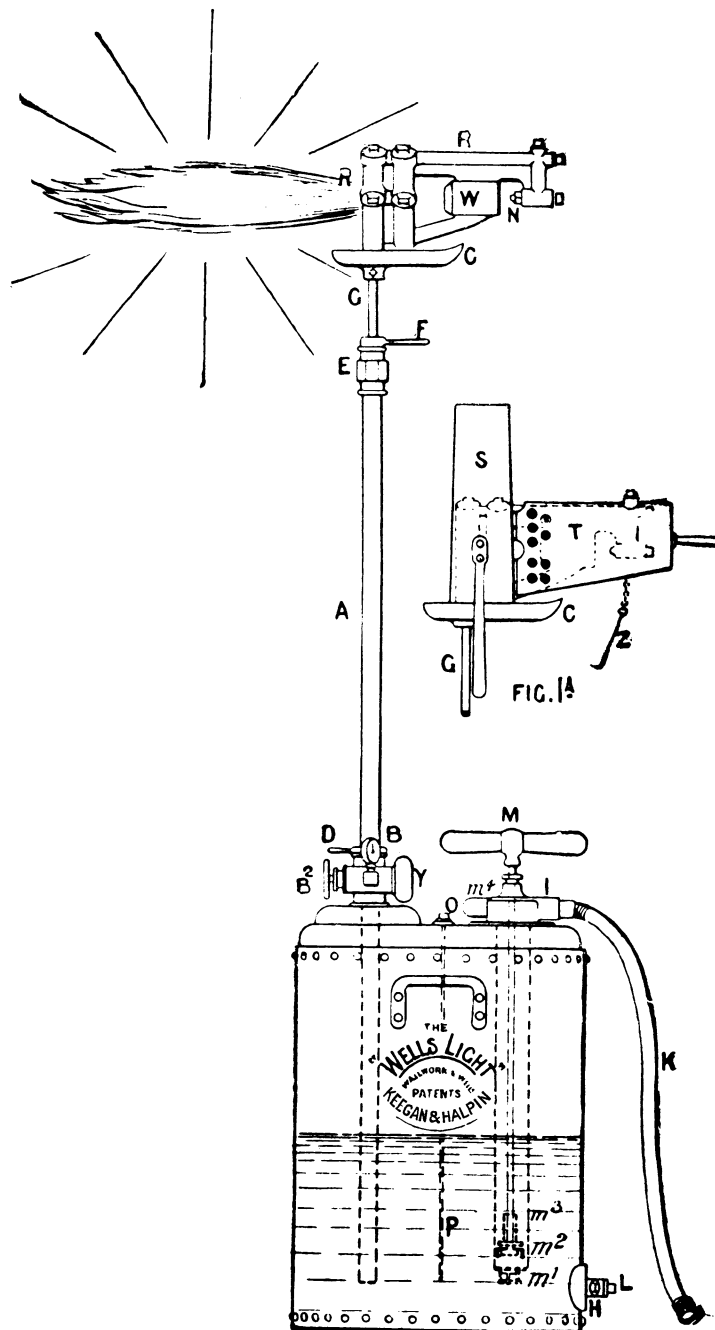
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THE WELLS LIGHT.

MANY of our readers may be familiar with the old form of a self-acting blast-lamp, for the use of alcohol, in which the alcohol was first vaporized by the heat of the lamp itself, and then this vapor, escaping under pressure, was burned. The object in this old lamp was to produce a high degree of heat. The object in the lamp we describe to-day is to produce a large amount of light.

The tank *P* contains kerosene, which is forced in by the pump till a pressure of about twenty pounds above that of the atmosphere is produced. This pressure forces the oil up through the piping *R*, surrounding the flame, in which piping it becomes vaporized; the vapor escaping under the pressure at *W*, and burning with a brilliant flame, as shown.

The flame is about two feet long, and is said to burn well un-



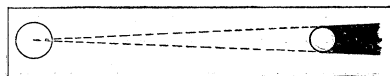
protected except when a high wind is blowing, when a wind-protector provided with the lamp allows all to go on well once more.

It will be apparent that a preliminary warming-up is necessary, to bring the piping around the flame to the proper temperature,

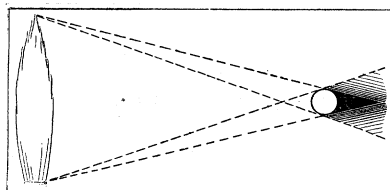
before this lamp can be lighted. This is done by burning a little oil in the dish *C* under the burner, or by a special lighting contrivance which brings a hot flame to bear on the vaporizing parts of the apparatus. As the lamp is primarily intended for out-door illumination, even the use of the oil in the cup is unobjectionable.

While this warming-up is in progress, the burner is covered with a sheet-iron hood, to confine the heat.

We have referred occasionally to the Manchester Ship Canal that is to make Manchester, England, a seaport. We now learn that these Wells lights are used for the night-work, and understand that their portability and large flames, rendering shadows less sharply marked, have caused them to be looked on with favor.



SHADOW FROM ARC-LIGHT.



SHADOW FROM OIL-FLAME.

The effect of the large flame of this oil-light in doing away with the black shadows which are found so objectionable when an electric arc-light is used is illustrated in the accompanying diagrams.

CERTAIN PROVISIONS OF CONTINENTAL LEGISLATION CONCERNING FOOD ADULTERATION.¹

DURING the past year I have had occasion to look up the subject of the laws and regulations now in force in European countries in reference to the sale of unwholesome or falsified foods, and believe that a brief *résumé* of certain provisions of such legislation may not be uninteresting to the members of this association.

To attempt to summarize what has been done in each country involves more or less of a review of its police administration, which would make this paper too long. Copies of these foreign laws, decrees, and regulations, and a list of our State laws on the adulteration of food and drugs, dairy products, and butter substitutes, will be found in the reports of the commissioner of internal revenue for 1888 and 1889, to which I would refer those specially interested in this subject.

In examining this mass of legislation, I was impressed with the large scope of the powers of the police authorities in continental Europe, and that there are many of these functions which our States might adopt with profit. For instance: in addition to what we consider the ordinary police duties relating to the enforcement of the laws and regulations respecting public order, the suppression of crime and violence, the supervision of the excise, of public places of amusements, etc., we find the following as being specified as part of the duties of the police administration in matters relating to public health: viz., —

(a) The registering and licensing, after previous examination by a board of experts duly appointed for that purpose, of all physicians, surgeons, accoucheurs, midwives, orthopedists, dentists, pedicures, trained nurses, and veterinarians.

(b) The registering and licensing, after suitable examination, of all pharmacists and of their assistants; also the inspection of all drug-stores, and the enforcement of rigid regulations concerning the sale of poisons.

(c) The supervision and inspection of all hospitals, whether public or private, public baths, prisons, schools, slaughter-houses, markets, stores, and other public and private establishments, in regard to their sanitary maintenance.

(d) The enforcement of all laws, and the making of all needful regulations to carry out their provisions, in regard to public health,

especially those concerning epidemic or contagious diseases of men or animals.

(e) The supervision and inspection of all articles which serve as foods, properly speaking, or as beverages, as well as those which are employed in the preparation, production, manufacture, or preservation of such foods, including the places where such articles are sold, stored, or manufactured (see the laws on sanitary police, of France, Belgium, most of the cantons of Switzerland, Germany, Italy, etc.).

It is to certain features of the laws and regulations on this last subject that I wish to call your attention. These may conveniently be divided into four heads; viz., general, special, penal, and executive provisions.

General Provisions.

The word "food" may be said to include all commodities, materials, or ingredients, of whatsoever character, intended for human consumption.

A food is considered as adulterated or falsified (a) when any substance has been added which does not exist in the normal product, or is only found there in an appreciably lower proportion; (b) when any substance has been subtracted that is normally present in the product, and which is not found in the abnormal product or only in an appreciably lower proportion; (c) when it is an imitation of, or sold under the name of, another article; and (d) when any substance has been substituted, wholly or in part, for the article.

The selling, offering for sale, or otherwise putting on the market, as well as the use, of any food commodity which is unwholesome, altered, or decomposed, is prohibited under severe penalties.

The selling and offering for sale, for the purpose of slaughtering, of animals infected with contagious and other diseases, as well as the selling and offering for sale of the meat from such diseased animals, is prohibited. Power to regulate the proper inspection before and after slaughtering is left to the competent authorities.

The employment of poisonous coloring-matters in the manufacture of clothing, wall-papers, toys, eating, drinking, and cooking utensils, and other articles of common use, as well as their use in wrappers and vessels intended for the packing or for the preservation of food, are also prohibited.

Every dealer in food commodities must be responsible for the quality of his merchandise, whether of foreign or domestic origin.

Every food material must be sold under its true name.

Every dealer having an artificial product imitating a natural product in his possession, whether the same is intended for sale or is claimed to be solely for his own use, must announce such fact by conspicuous placards in his shop. All such artificial products must be duly labelled in a conspicuous and legible manner, bearing the name of the merchandise accompanied by the prefix "artificial."

The manufacture of, trade in, and offering for sale of, substances intended for the adulteration of articles for food is forbidden or restricted to certain prescribed methods and substances by stringent regulations of the competent authorities.

The power to regulate and to supervise the methods and the means for carrying out the provisions of these laws is placed with the competent authorities.

Special Provisions.

These include clear and concise definitions of the different food-products, as well as very often an accurate statement of what shall be the minimum chemical composition of such foods or their ingredients. The latter feature, however, is, owing to the constant advance made in the methods of chemical analysis, and also, it must be said, to the shifting character of adulterants used, much better left to frequently revised regulations by competent authorities than to the precise wording of a law.

1. BUTTER AND CHEESE. — These must be made from milk or cream, or both, and with or without common salt. Any admixture of a foreign fat not derived solely from milk makes the product artificial, and it must consequently be so labelled and sold. Most of these countries have special laws on the manufacture and trade in artificial butters (see reports of the commissioner of internal revenue for 1888 and 1889).

¹ Presented at the annual meeting of the American Public Health Association, Oct. 22-25, and published by permission.

2. **CONFECTIONERY.**—This must only be colored with harmless materials, such as (black) chinese black; (blues) Berlin blue, indigo, litmus, Prussian blue, saffron blue, ultramarine; (brown) caramel; (greens) chlorophyl (as spinach-juice), mixtures of yellow colors with blue (a mixture of Prussian blue, Berlin blue, and Persian berries gives a green rivalling in brilliancy Schweinfurt's green); (reds) annatto, Brazil lac, carmine, carmine lac, cochineal, orseil, the juice of beets and red berries (such as cherries and currants, etc.); (yellows) Avignon berries, curcuma, fustel, marigold, Persian berries, quercitron, safflower, saffron, turmeric; chalk and the ochres. The use of substances known to be injurious to health is forbidden in this and other food commodities. Among these injurious substances are included salts of antimony, arsenic, barium, except the sulphate; bismuth, cadmium, chromium, cobalt, copper, iron, the chloride and sulphate, though most iron salts are harmless; lead, magnesium, nickel, zinc, and some of the potassium and sodium salts; oxalic acid, picric acid, cocculus indicus (Indian berry, Levant nut), picrotoxine, gamboge, aniline, aloes, eosine, fuchsine and its immediate derivatives; coloring-matters containing nitrous vapors, as naphthol yellow, victoria yellow, coloring-matters prepared with di-azo compounds.

3. **DISTILLED BEVERAGES.**—These (such as kirsch, brandy made from grape residue, from lees, or with juniper berries, gentian, etc.) must only bear the name of "natural" when they are produced by the fermentation and subsequent distillation of the fruit or material of which they bear the name, without any addition whatsoever. The sale of these beverages made artificially with alcohol, or increased by alcohol and other substances, is tolerated, provided the mixture contains nothing injurious to health, and is properly labelled.

4. **FLOUR AND BREAD.**—The sale of any flour containing ergotized grains is forbidden. The addition of any flour of an inferior value constitutes a fraud if the mixture is not specified. Wheaten flour shall be composed entirely of ground wheat, free from bran, perfectly white, or having a faint tinge of yellow; must not show red, gray, or black specks, nor possess a disagreeable odor; must contain no foreign meals, as rye, corn, barley, peas, beans, rice, linseed, buckwheat, and potato-starch; no alum to disguise the presence of damaged flour in mixtures, or to improve the appearance of an inferior grade, etc.

5. **FRUITS AND VEGETABLES.**—The sale of unripe or of rotten fruits or vegetables is forbidden.

6. **HONEY.**—Honey must consist of the saccharine substance collected by the bee (*Apis mellifica*) from the nectaries of flowers, and deposited by them in the cells of the comb. It must not contain any added starch-sugar (glucose), cane-sugar, or inverted sugar.

7. **LARD.**—This must be made exclusively from the rendered fat of the hog, and must not contain any foreign fats.

8. **LIQUEURS.**—These must be free from unwholesome materials, toxic bitter substances, fuchsine and other coloring-matters, etc.; and, as they are all artificial products, they must be duly labelled.

9. **MALT LIQUORS.**—These must consist of the fermented alcoholic infusion of malted barley with water, and flavored with hops. The replacement of these substances by others is considered, if these are inoffensive, as a violation of, and, in case they cause injury to health, as an offence against, the law. They must not contain antiseptics, salt (except that derived from the water used in brewing), or alkaline bi-carbonates. The beer-pumps used must be so fitted as not to produce any alteration in the beverage. The pipes must be as short as possible, and formed of pure block tin. They must be washed out every day with boiling water, and every eighth day with a solution of soda. The air used must be drawn from without, and caused to traverse a bed of pounded and sifted charcoal. The whole apparatus must be kept in a state of perfect cleanliness.

10. **MEAT.**—Every animal, before being slaughtered, must be inspected by a competent veterinarian, who will issue the necessary health certificate. An inspection is again made when the carcass is ready to be cut up, and before the removal of the viscera. The inspector will give a permit of sale if he considers the meat sound. Meat is considered injurious which is derived from animals (*a*)

dying from internal disease, (*b*) poisoned, (*c*) affected by a contagious disease, or (*d*) by a malady involving the decomposition of the blood; also all meats containing any parasites, as trichinæ, capable of developing in the human body, and all meats entering into putrefaction. The sale of all meat derived from a sick animal is forbidden, whether it may or may not be injurious to health. The slaughtering of calves under sixteen days old, as well as the sale of such veal, is forbidden.

11. **MILK.**—The sale of milk coming from sick cows is prohibited. Persons coming in contact with invalids suffering from contagious diseases should abstain from the handling of milk. The use of vessels of copper, brass, zinc, pottery poorly glazed or made with lead enamel, must be avoided. Places for storing or retailing milk should be clean, airy, and located at a distance from sleeping or sick rooms. The use of carbonate of soda, salicylic and boracic acid or their salts, as well as other materials intended as preservative agents of milk, is prohibited. The removal of cream, the addition of water, foreign fats, or coloring-matter, are considered as adulterations. Milkmen are required to mark upon their cans in an indelible manner the kind of milk they contain: (*a*) whole (pure) milk; (*b*) mixed or half-skimmed milk, resulting from the mingling of the skimmed milk with the morning's whole milk; and (*c*) skimmed milk, i.e., milk entirely without cream. In the two latter cases milkmen must notify their customers of the character of the product. A specific-gravity test at 15.5° C. (60° F.) of 1.03 is generally recognized as the minimum for pure milk, though chemical analysis is depended upon in cases of dispute.

12. **SPICES AND COLONIAL PRODUCE.**—These must be sold in a pure and unmixed condition.

13. **TINNING.**—The tinning of all copper and iron utensils used in the preparation or preservation of foods must be made with pure tin, or one containing not more than one per cent of lead. Galvanized (i.e., coated with zinc) vessels are not allowed.

14. **VINEGAR.**—This must be composed only of acetic acid, and must not contain any other acid, either mineral or organic.

15. **WINE.**—Nearly every wine-producing country in Europe has special laws on this subject, in which a sharp distinction is drawn between natural and artificial wines. A natural wine is defined as the liquid product which results from the alcoholic fermentation of the juice of fresh grapes without any addition whatsoever. Every wine which has not been made solely from the juice of fresh grapes must be sold under the denomination of "artificial wines." Artificial wines may be divided into two classes,—viz., imitation and demi-wines,—defined as follows: Artificial wines are alcoholic liquids which resemble natural wines, but which are not derived from the fermentation of unaltered grape-juice, and are made with a mixture, such as water, brandy, alcohol, glycerine, sugar, tartaric acid, cœnanthic ether, etc., to imitate wines; demi-wines are those resulting from the addition to the must or natural wine of water, sugar, alcohol, and other substances, intended to produce the taste or appearance of wine in such diluted and attenuated liquids, or made in the same manner with grape marc, already used in the preparation of must. Provisions are made for the proper branding and labelling of all vessels and packages containing wine, and for distinctive way-bills, invoices, etc., used in the shipment and the sale of wines. All wines not labelled as artificial are considered as being genuine wines, and severe penalties are imposed for violations of this provision.

Penal Provisions.

The penalties prescribed range from a small fine, to imprisonment in the house of correction or the penitentiary, with or without hard labor, for a term of years or for life, depending on the gravity of the offence.

In occupations requiring a license from the authorities, said license may be rescinded, and the offender may be deprived of the privilege of carrying on such occupation for a longer or shorter period of time, in the discretion of the court. The repetition of an offence within a year is generally punished by doubling the penalty provided for the first offence.

The selling, offering for sale, or otherwise putting on the market, of a product under a name other than that which its nature requires, although the value of the product may be the same, is con-

sidered a fraud, and so punished. Such products may be seized, confiscated, and rendered unfit for use, by the competent authorities.

Executive Provisions.

The police administrations are charged with the supervision and the execution of these laws, having power to make and enforce the necessary regulations.

There is generally a State commission of control, composed of three or more experts, appointed with the necessary police powers, to whom this subject is intrusted. They have under their directions the inspectors, veterinarians, and chemists necessary for the proper execution of the laws and regulations. The co-operation of the local police officials, whenever necessary, is obligatory.

The commission meet at least twice a year for the transaction of business. They must also make at least two inspections a year of all factories and warehouses for food.

The inspection and supervision of all establishments intended for the public preparation, manufacture, or sale of foods must be performed by the inspecting officials employed by the commission. The inspections of these establishments must take place at least twice a year, and without previous notification to the owners. Reports of such inspection are made in writing to the commission.

The inspecting officials have the right to enter any establishment within their jurisdiction during the usual business hours or when such places are open to the public, and to take for examination such samples as are necessary.

When the examination of samples cannot take place on the spot, but demands a chemical, microscopical, or similar examination, two samples must be taken, and placed under seal, by the inspecting official, in the presence of the owners or their representatives, who likewise may affix their own seals thereto. One of these samples is forwarded to the commission with a report, and a request for the proper examination thereof, and the other is retained by the inspecting official. On demand of the owner, another similarly sealed sample may be retained by him.

When there is reason to believe that a food is adulterated or unwholesome, the inspecting official may order it detained until a proper examination can be made.

If the sample proves, on examination, to be adulterated or unwholesome, the cost of said examination is paid by the offender; but otherwise the State pays the cost of the samples taken and of the examination.

All unwholesome foods are to be confiscated and destroyed without compensation to the owner.

Private individuals may have samples of food examined by the experts of the commission on complying with prescribed regulations and by paying a moderate charge, or free of charge in many countries.

EDGAR RICHARDS.

THE ANCIENT ETRUSCANS.¹

THE problem of the ethnologic position of the ancient Etruscans must be considered as yet unsolved. In spite of the prolonged labors of Corssen and Deecke, the theory that attached the Etrusci to the Indo-European stock rests on such feeble foundations that it is rejected by some of the ablest specialists in this branch; while the Turanian or Ugric origin, so vehemently advocated by Dr. Isaac Taylor, Mr. Robert Brown, jun., and others, is now dismissed as untenable by all the continental Etruscologists.

As for those other hypotheses which connect the inhabitants of Etruria with the ancient Copts, with the Israelites, with the Lydians, with the Armenians, with the Hittites, with the Celts, with the Basques, and what not, they never had enough in their favor seriously to attract the attention of scholars.

One defect in these theories has been that they were all based on one ethnic element only. Their authors seem unaware that in the present condition of ethnologic science it is insufficient to deduce conclusions from the language only, or the arts only, or the legends or the physical features only, of a nation: all these must

be taken into account where the problem is complex, and the verdict of each must be carefully weighed.

My attention was especially called to this problem while spending some months in Italy early in the present year, where I had the opportunity of seeing the many museums of Etruscan antiquities which are so intelligently preserved and displayed in that country.

I had reached the Italian shores by the most ancient travelled route from the coast of Africa; that, indeed, which was taken by the pious Æneas himself, sailing from Carthage by way of the Isle of Pantellaria to Marsala, the ancient Lilybœum.

On a clear day one is rarely out of sight of land on this crossing, for no sooner do the bold headlands on either side of ancient Carthage sink in the south-west than the volcanic cone of Pantellaria rises in sight; and when that is lost to view, the mountainous coast of southern Sicily is soon perceived. The distance between the two islands is not quite sixty English miles, — an interval of space which was not enough to offer any serious barrier to even very early ploughmen of the Mediterranean main.

I dwell on these geographic details with a purpose, as you will see later; and I mention the fact of my journey in Africa, as it was the observations I made there which first led me to the conclusions I am about to present in this paper. Part of my time had been passed on the borders of what is called "la Grande Kabylie," — that portion of the province of Algiers which is inhabited by the Kabyles, the most direct descendants of the ancient Libyans.

They are a strange people, these Kabyles, both in customs and physical aspect. Natives of Africa time out of mind, many of them present the purest type of the blonde races, — blue or gray eyes, tawny beard, fair complexion, curly light or reddish hair, muscular in build, and often tall in stature. When I came to look at the many evidently portrait busts on the tombs of the ancient Etruscans, there was something in the features, in the shape of head and face, which reminded me of these Kabyles. Slight as it was, it induced me to compare the two peoples in other details, and it is the result of this comparison which I now submit to be weighed and judged by those competent in such matters.

Etruscan remains are found in Italy from the Gulf of Salerno to the River Po, and from the Tyrrhenian Sea to the Adriatic. One inscription, indeed, has been unearthed at Verona, perhaps one near Chiavenna; and even at Chur I was shown one, in the Rætian Museum, which the curator averred had been dug up near that city. Certain it is, however, that the right bank of the Po was substantially the northern limit of Etruscan culture.

They were essentially city-builders and city-dwellers; and at the height of their power, which we may put about five or six hundred years before the Christian era, they appear to have had three federations, of twelve cities each, within the limits I have named. This statement might easily lead to an excessive idea of their numbers; but it is well ascertained that the Etruscans constituted by no means the bulk of the population. They were only the ruling class, a slave-holding aristocracy; while the large majority of the inhabitants belonged to native Italian tribes, as the Umbri, the Osci, the Ligures, and others.

All the ancient writers recognize the Etruscans as intruders on Italian soil, and they themselves are said fully to have acknowledged this, and indeed to have had certain legends as to the time and place of their first permanent settlement on the peninsula. It is only in utter defiance of these semi-historic reports that Virchow and others bring them down from the Alps, across the plains of Lombardy, through the defiles of the Apennines, and at length to the shores of the Tyrrhenian Sea. Neither the classical historians nor the Etruscans themselves knew a vestige of such a tradition. The erudite Otfried Muller, who has collected every thing to be found in Greek and Latin literature concerning them, states that it is the unanimous testimony of antiquity that the earliest Etruscans reached the western shore of Italy, crossing the sea from the south; and he adds that it is undeniable (*unleugbar*) that such was the belief of the Etruscans themselves. We know that by tradition and religious customs they assigned as their first permanent settlement the city of Tarquinii, the modern Corneto, on the shore of the Mediterranean, twelve miles north of Civita Vecchia.

¹ Abstract of a paper by Daniel G. Brinton, M.D., read before the American Philological Society, Oct. 18, 1889.

To this venerable site the priests and soothsayers resorted from all parts of Etruria to perfect themselves in the pure and ancient "Etruscan discipline." Here their hero-god Tages, a wondrous gray-haired boy, sprang into life from a ploughed furrow, and taught their ancestors the mysteries of the diviner's craft and the nobler arts of life. This locality, I say, according to uniform tradition, was where their progenitors first established themselves, crossing the sea from somewhere to the south. Such a tradition, so definitely preserved, cannot be cast aside without sound reasons.

The date of this landing has been given by Müller at about two hundred and ninety years before the founding of Rome, while other writers are inclined to put it earlier by five hundred years. Between a thousand and twelve hundred years before the Christian era is probably as near as we can now fix it.

Now that the extensive excavations in Etruscan sites enable us to have a survey of the whole field of their operations, it is conceded more and more that the line of their migration was from south to north, from cisapennine to transapennine localities. Their settlements at Marzabotto, Bologna, and beyond, were visibly later and of briefer duration than in Etruria proper. The Etruscan alphabet of North Italy also reveals plain marks of degeneration, and the forms of the inscriptions are less archaic.

We do not have to depend upon guess-work for a knowledge of the physical features of the Etruscans: we have a vast realm of mimetic art preserved, much of it unquestionably faithful to the originals; and, in spite of the frequent custom of incineration, hundreds of genuine Etruscan skeletons have come down to us in a good state of preservation.

It surprises me, that in spite of this, and although the anthropometric results I am about to quote have been published for years, Dr. Deecke, in his recent edition of Müller's "Etrusker," takes no note of them, but repeats the old statement that this people was short in stature, heavy-set, obese, and dark. Of course, Dr. Isaac Taylor, in order to give countenance to his theory that the Etruscans were Turanians, is glad to adopt this opinion. He would not have liked to take cognizance of the modern anthropologists who have studied the subject, for nothing more fatal to his theory can be imagined than their results.

The old notion seems to have arisen from expressions in two late Roman poets, Virgil and Catullus, who speak of the Etruscans as fat. *Pinguis Etruscus* and *obesus Etruscus* are their words. It has also been commented on that the Etruscan cinerary urns frequently represent short, stout men, with disproportionately large heads and arms. This, however, was merely a technique of the national artists. They often put all their work on the upper, and effaced the lower portion of the figure, as not presenting individual characteristics. Where the full figure is shown, as in some beautiful specimens in the Museum at Florence, the squat appearance referred to is not apparent.

Fortunately we do not have to rely on the contradictory testimony of art to learn the stature of the Etruscans. The Italian anatomists have measured two hundred of their skeletons, and from these have deduced, in accordance with well-known osteologic rules, the height of the average individual. The result shows them to have been an unusually tall race, the average of the two hundred persons having been 1.75 metres, or very nearly five feet nine inches. This is greater than the average height of our soldiers during the war, which was 1.70 metres, and is rather above the average of the soldiery of any European nation to-day, though less than some of the picked corps, — the French carabineers, for example. It is a little more than the average stature of the Algerian Kabyles, who, nevertheless, are a tall race, averaging above 1.70 metres.

Dr. Taylor and his followers do not fare better when it comes to cranial measurements. The typical skull of the Turanian stock is short and roundish, — brachycephalic; that of the Etruscan was markedly of the long type, — dolichocephalic. MM. Hovelacque and Hervé quote the results of three extended measurements of the cephalic index by Italian craniologists as showing 75.6, 76, and 77.3. Less than a fourth of the crania can be called brachycephalic.

It is interesting to compare these figures with measurements

from the skulls of the modern descendants of the ancient Libyans, — the Kabyles. According to data furnished by two excellent observers, MM. Topinard and Lagneau, these are respectively 76.7 and 77.3, almost absolutely the same as for the old Etruscans.

There is a current tradition in Italy that the Etruscans were blondes, with light hair and blue eyes. I met a Tuscan wine-merchant who lived near Florence, and he pointed with pride to his handsome blond beard, informing me that his family claimed Etruscan descent, and that his beard was proof of it. There is evidence from ancient art that this piece of folk-lore is correct; and the eminent anthropologist I have just quoted, M. Topinard, sums up, with his usual correctness, our anthropologic knowledge of this people when he says, "From the evidence before us, we may decide that the Etruscans were of large stature, blondes, and dolichocephalous; while their predecessors, the Umbrians, were small and brachycephalous."

In all these physical traits we discover a coincidence with the ancient Libyan or true Berber type, as seen in the Kabyles of the Djurdjura Mountains, the Rifians of Morocco, and the former inhabitants of the Canary Islands, the Guanches. There is no doubt but that the last mentioned were a true branch of the Berber stock. The fragments of their language, which have been collected and critically edited by Sabin Berthelot and others, prove that it was closely allied to the dialect of the Morocco Rifians. Their skeletons show them to have been an unusually tall race, quite a number of individuals ranging from six to six and a half feet in height. Their skulls present the same dolichocephalic index as the Kabyles; and that they were largely blondes, is attested by the early navigators, who speak of their long yellow hair reaching down to below their waists. The presence of these blondes on the Canaries destroys the theory sometimes advanced, that the blond hue of the Kabyles arose from admixture with the Goths at the period of the dissolution of the Western empire; for the Canaries were peopled by the Berbers long before the Christian era, and Dr. Verneau has quite recently discovered Numidian inscriptions there. But, for that matter, this hypothesis is untenable for other reasons. The blond Berbers are referred to on Egyptian monuments; and, as for the Goths in Africa, they had entirely disappeared as early as when Procopius wrote his history.

All this goes to show that the physical type of the ancient Etruscans was the same as that of the ancient Libyans, and entirely distinct from any then existing on the Italian or Hellenic peninsulas. This identity can be traced in other features of importance to the anatomist. The orbital index of the modern Kabyles is 88.1; of the Etruscans, 87.4, a remarkable approximation. The nasal indices of both range between 44 and 49. In both there is a lack of accentuation of the cranial prominences.

Wherever the first settlers of Tarquinii came from, they do not seem to have brought with them the higher arts of life. Most of these were later acquisitions, learned from their neighbors, the Greeks of Sicily and Magna Grecia, and in longer voyages for trading and piracy, which extended to Greece itself, to the coasts of Asia Minor, to Egypt, and to the Semitic cities of Palestine and their colonies at Carthage and elsewhere. Etruscan art yields positive testimony to all these influences, especially that of the Greeks. The Etruscan alphabet appears to me to have been derived directly from the Greek, and not from the Phœnician, as Rawlinson and others have thought. We must carefully exclude all these external borrowings if we would make a correct comparison of real Etruscan culture-traits with those of other nations. When this is done, it will be found that in some characteristics they stood in bold relief from all the nations I have mentioned.

No one of these is more conspicuous than the position assigned to woman in Etruscan civilization. It was in astonishing contrast to her place among the polished Greeks, and still more so to her station in Oriental life. With the Etruscans, evidently a strictly monogamous people, she was the equal and the companion of her husband. She sat by his side at the feasting-board; she was cared for in the most attentive manner; her image was carved with his on their common tomb; and there are a thousand evidences that she was not merely the idol, but the honored help-

mate, of the man. It was from this Etruscan example that early Rome drew the principle of monogamy and of the substantial independence of woman; and, whatever we have of that noble element in modern life, it is a legacy through Rome from ancient Etruria.

This was decidedly neither a Hellenic nor an Eastern principle, but we do find it from the earliest times among the Berbers. Even in spite of the polygamous doctrines of Mohammedanism, the woman still retains her position in Kabyle life as the companion and helpmeet of man. Their *Kanoun*, or ancient code of laws, often in conflict with the Koran, and always respected in preference to it, protects her autonomy in a variety of ways, and the independence of her position has been a frequent theme of comment with travellers.

Another marked and peculiar element in Etruscan life was the recognition of the principle of confederation in politics. Their league of twelve independent cities was the first of its kind in the ancient world. Canon Rawlinson forcibly points out how far it was superior to the temporary and unstable alliances of the Greeks. In this lay the secret of the rapid success of Etruria.

Here, again, is a singular identity with North Libyan governmental features. The very word "Kabyle" (the Arabic *q'bail*) means "confederation," and refers to their ancient system of a political union of thoroughly independent communities. Nor is this a recent growth. The name by which the Kabyles were known to the Latin writers was *Quinquegentes* ("the five nations"), referring to the coalition which then, as now, existed among them.

The Etruscans were bold navigators. For more than a century (600-500 B.C.) they were the virtual masters of the Mediterranean. It may be objected that in this they were unlike the Libyans; but it must be remembered that the Libyans undoubtedly did at that time venture out into the Atlantic as far as the Canary Islands, and peopled them, — a greater distance from land than the passage of the Mediterranean requires.

I cannot pursue this parallel in other directions, for lack of material. We know something about the Etruscan religion; but Christianity and Mohammedanism have effaced every vestige of the ancient cult of the Berbers. The architecture of the Etruscans was wonderful; but, beyond the fact that the ancient Libyans were builders of megalithic monuments and of dwellings of cut stone, little has come down to us regarding their knowledge of this art.

One of the ablest of ancient historians, Dionysius of Halicarnassus, asserted that the Etruscan language was *sui generis*, without affinity with any other. Such seems to have been also the most recent verdict of modern linguistic research. Dr. C. Pauli, one of the best authorities on it now living, pronounces all attempts to trace its relationship to be failures; and Dennis, the learned English Etruscologist, states his opinion that it is as isolated as the Basque. Dr. Pauli, indeed, decries all attempts to trace, in the present state of our knowledge, its affinities, and himself sets the example of studying it from its own monuments alone.

These monuments are not insignificant. We have preserved to us, more or less complete, over six thousand inscriptions in the Etruscan alphabet and language, a few of them bilingual, usually with the Latin. We know the value of the Etruscan letters, and, up to a certain point, the phonetics of the tongue. Some words have been preserved to us in Greek and Latin writers with their meanings, and the sense of others can be approximately made out from their recurrence in a great many inscriptions of a certain class. We also have the numerals, and a multitude of proper names, personal and geographic.

If, with this apparatus at command, I venture to disregard Pauli's warning, and to institute a comparison between the Etruscan and Libyan languages, it is because I think the material is sufficient at least to be worth the attention of students. So far as I know, no one has attempted any such comparison before; nor do I find that this possible origin of the Etruscans has as yet been advanced, obvious as it seems to be.

One reason of this has doubtless been the extremely little available knowledge of the Libyan tongues, ancient or modern. What we do definitely know may be briefly rehearsed.

The modern Libyan, or Berber, is spoken by hordes scattered from Timbuctoo to the Mediterranean, and from the shores of the Atlantic to the borders of Egypt. It is divided into a number of dialects, which are phonetically grouped into two classes, — the "strong" and the "weak," — characterized by the regular transformation of certain consonantal sounds, principally *k* to *l*, *t* to *d* or *r*, *s* to *ch*, etc. When the action of these phonetic laws is understood and allowed for, the fundamental unity of all the dialects becomes apparent, both in their vocabulary and grammar.

The themes are both nominal and verbal; but the latter are much the more numerous, and form the grammatical characteristic of the group. They are nearly all consonantal, and may be of one, two, three, or four letters, subject to internal vowel change, and modification of the idea by prefixes and suffixes.

The modern Kabyle, which has adopted many Arabic words, is written with the Arabic alphabet; which, however, does not render correctly some of its sounds. The Touareg, the dialect of the desert, has preserved an alphabet of its own, no doubt a form of the ancient Numidian, which in turn was derived from the Semitic Carthaginian. The Tamachek, as this venerable A B C is called, does not express the vowel-sounds nor separate the words. It is said to have been retained principally through the efforts of the women, who are the *literate* of the tribe.

The ancient Libyan or Numidian was the parent stem of these dialects. Some hundreds of inscriptions in it have been preserved, a few of them bilingual: so there is a possibility that we may recover the grammar of this now lost tongue. Professor Newman, indeed, has made an effort to restore it from modern Berber dialects; but I am surprised that he has made no use of this epigraphy.

These various Libyan dialects form the western branch of a large family of tongues, of which the eastern branches include the modern and ancient Coptic, the Abyssinian, and others. The whole family has been called "Hamitic," or "Cushite," or "Proto-Semitic," of which terms the first is the best, simply because it conveys no preconceived hypothesis. The grammar of all the Hamitic languages shows similar traits. The nouns have a masculine and feminine form; the radical may be of one or more syllables, and, unlike the Semitic tongues, it remains unaltered in the process of word-building; there are plural but not dual forms; relation is expressed by both prefixes and suffixes; and the verb originally had but one form, instead of the two or more found in the Semitic languages.

The general grammatic aspect of these languages, however, leaves no doubt but that at some remote epoch they were derived from the same original form of speech from which the Semitic languages trace their descent: hence they are classified as the "Hamito-Semitic" stock.

Where was the original seat of the tribe who spoke this parent tongue, has not been ascertained. The uniform opinion of scholars has been that it was somewhere in western Asia; and, though the question does not immediately concern the present discussion, I cannot forbear adding that I hold this to be a mistake, and that the original seat of the Semites was on or near the Atlantic coast.

In conclusion, I would submit the following as the results of this inquiry: 1. The uniform testimony of the ancient writers and of their own traditions asserts that the Etruscans came across the sea from the south, and established their first settlement on Italian soil near Tarquinii: this historic testimony is corroborated by the preponderance of archæologic evidence as yet brought forward. 2. Physically the Etruscans were a people of lofty stature, of the blonde type, with dolichocephalic heads. In these traits they corresponded precisely with the blonde type of the ancient Libyans, represented by the modern Berbers and the Guanches, the only blonde people to the south. 3. In the position assigned to woman and in the system of federal government, the Etruscans were totally different from the Greeks, Orientals, and Turanians, but were in entire accord with the Libyans. 4. The phonetics, grammatical plan, vocabulary, numerals, and proper names of the Etruscan tongue present many and close analogies with the Libyan dialects, ancient and modern. 5. Linguistic science, therefore, concurs with tradition, archæology, sociologic traits, and anthropologic evidence, in assigning a genetic relationship of the Etruscans to the Libyan family.

THE USE OF OIL.

As the season of winter storms on the North Atlantic is approaching, navigators should note the many instances where serious danger and damage have been avoided by using oil to prevent heavy seas from breaking on board. It will be remembered that on the "Pilot Chart" for last March a full explanation was published, with diagrams, as to the best methods of using oil. Reprints of this explanation and accompanying diagrams can be obtained at any branch hydrographic office.

There are many other cases where oil may be used to advantage, such as lowering and hoisting boats, riding to a sea-anchor, crossing rollers or surf on a bar and from life-boats and stranded vessels. Thick and heavy oils are the best. Mineral oils are not so effective as animal or vegetable oils. Raw petroleum has given favorable results, but not so good when it is refined. Certain oils, like coconut-oil and some kinds of fish-oil, congeal in cold weather, and are therefore useless, but may be mixed with mineral oils to advantage. The simplest and best method of distributing oil is by means of canvas bags about one foot long, filled with oakum and oil, pierced with holes by means of a coarse sail-needle, and held by a lanyard. The waste-pipes forward are also very useful for this purpose.

In addition to the reports published last month from vessels that used oil during the St. Thomas-Hatteras hurricane of Sept. 3-12, the following have been received by the United States Hydrographic Office from vessels that encountered the same storm:—

The British steamship "Elgiva" (Capt. Bempohl), Sept. 4, when in latitude 24° north, longitude 65° west, kept oil-bags at bows and channels to prevent seas from coming on board. The oil had a remarkable effect in smoothing the seas, and the vessel sustained no damage whatever. The British brigantine "Victoria" (Capt. Simmons), in a terrific hurricane, Sept. 5, latitude 26° north, longitude 68° 38' west, lost spars, sails, etc. A quantity of cod-oil was used, and it is thought that it saved the ship's hull from damage, and possibly total loss. The American brig "Mary Bartlett" (Capt. Holmes), Sept. 8, latitude 36° 42' north, longitude 74° 22' west, commenced using oil (paint and kerosene mixed). On Sept. 9, the wind north-east and blowing in terrific squalls, oil was used with great success. The British brig "J. A. Horsey" (Capt. Dowling), in a hurricane off capes of the Chesapeake, Sept. 9-12, used kerosene-oil, but without as great success as if it had been a heavier oil, of which there was none on board. The American schooner "Ralph M. Haywood" (Capt. Baxter), in a hurricane off capes of the Chesapeake, Sept. 9-11, used axle-oil in bags hung over the weather bow. The bags were replenished every two hours; in all, about five gallons being used, and with great success. The Italian bark "Biagino" (Capt. Brignati) encountered the hurricane, Sept. 9-12, after leaving the Delaware Breakwater for Cagliari. The cargo was petroleum, and, as the vessel leaked badly, a large amount of the oil was pumped out. As stated above, a thin oil like refined petroleum has but little effect, and such was the case in this instance. The British steamship "Claribel" (Capt. Macknight) encountered the hurricane, Sept. 9-11, between latitude 37° north, longitude 73° west, and latitude 34° north, longitude 71° west. Oil was used with success, and prevented many a heavy sea from breaking over the vessel.

MENTAL SCIENCE.

Experiments in Crystal-Vision.

THERE is a general tendency, whenever a notion is relegated to the rank of superstitions, to regard all interest in the matter as ending there. Such an attitude neglects to distinguish between error founded upon a false observation of facts and error founded upon a false interpretation of facts: it neglects to consider as well that the origin of this superstition also needs explanation. A superstition is rarely a purely fanciful notion spun from the inner consciousness, but usually contains, though often in a scarcely recognizable form, an element of interesting and perhaps important knowledge. It is with a full appreciation of this latter point of view that an anonymous lady writes in the recently issued number of "The Proceedings of the Society for Psychical Research" upon

the phenomena of crystal-vision, and reviews these in the light of cognate experiments of her own. The phenomenon, though simple, has a very ancient and varied history. It consists in gazing into a crystal, a drop of water, polished metal, a gem, or even the finger-nail, and seeing there reflected certain appearances usually to be interpreted as of prophetic significance. The custom is very widespread in the Orient both in the most ancient and in modern times. It has been found among savages, it has been counted as an instrument of the devil, it has received noble treatment at the hands of the learned before the courts of princes. Like most such customs, it has been surrounded with mystic and religious proceedings, and its exercise controlled by elaborate and fanciful directions. The Assyrians, the Hebrews, the Greeks, the Romans, were acquainted with the process, and give evidences of its use. In early Christian times those who read the future by gazing into a mirror received the title of "specularii." They appear in a church council convened by St. Patrick in 450, while we have a list of procedures against them as heretics in the twelfth century. Although Thomas Aquinas attributes this power possessed by some children to the work of the devil, and though a special condemnation of it was made by the theological faculty of Paris in 1398, the art continued, and in the sixteenth century reached its zenith under the auspices of a court physician or a university professor. Catherine de Medic consulted a magician, who showed her in a mirror how long her sons would occupy the throne. The topic was brought into prominence by the work of Dr. Dee, a very entertaining personage, under whom the process was systematized, and produced wonderful results. Dr. Dee and his associate, one Kelly, of dubious repute, see spirit visitors in their crystal or shew-stone who are described in all detail. Moreover, they hold long conversations with them, though what they learn from the "angelical beings" is often mere "sermon-like stuff." The stone is "of that value that no earthly kingdom is of that worthiness as to be compared to the virtue or dignity thereof;" it is brought to him by angels; it is miraculously restored to him; it is placed in a sanctuary, and shown with great ceremony. We read of many other uses of the crystal: we have instructions whereby to have a spirit enclosed in a crystal stone or beryl glass; and from these mediæval notions we have almost a continuous use of the process down to modern times.

Considering the function of the crystal simply as a means of concentrating the gaze, our author attempts to follow the course of these visions by analogy with other hallucinations, and regards them as consisting mainly of (1) "after-images or recrudescence memories, often rising thus, and thus only, from the subconscious strata to which they had sunk;" and (2) "as objectifications of ideas or images consciously or unconsciously in the mind of the percipient." "The tendency of the conscious memory is so strongly in favor of picture-making, that we may naturally assume this habit on the part of that which is latent or subconscious." This, at any rate, is true for the lady in question; for she is gifted with a remarkable power of visualization, that goes far to explain her success at crystal-vision. When desirous of describing a room in a friend's house, she tells us, "I return in recollection to the occasion of my last visit. I once more occupy the same chair. The carpet at my feet becomes visible, the furniture nearest to my seat, gradually the whole contents of the room, till walls and ceiling complete the picture, and I am able to give an inventory which would not disgrace an auctioneer's clerk." The exercise of this faculty, and especially with regard to phenomena of the unconscious, seems to be much aided by fixation of the attention upon the crystal. To quote from the record of experiments, "Here, for example, I find in the crystal a bit of dark wall covered with white jessamine, and I ask myself, 'Where have I walked to-day?' I have no recollection of such a sight, not a common one in the London streets; but to-morrow I will repeat my walk of this morning with a careful regard for creeper-covered walls. To-morrow solves the mystery. I find the very spot, and the sight brings with it the further recollection that at the moment we passed this spot I was engaged in absorbing conversation with my companion, and my voluntary attention was pre-occupied." Or, again, "I had carelessly destroyed a letter without preserving the address of my correspondent. I knew the county, and, searching in a map, recognized the name of the town, one unfamiliar to me, but which I was sure

I should know when I saw it. But I had no clew to the name of house or street, till at last it struck me to test the value of the crystal as a means of recalling forgotten knowledge. A very short inspection supplied me with 'H. House' in gray letters on a white ground, and, having nothing better to suggest from any other source, I risked posting my letter to the address so strangely supplied. A day or two brought me an answer, headed 'H. House' in gray letters on a white ground." Again, "the question of association, as in all cases of memory, plays an active part in this class of crystal-vision. One of my earliest experiences was of a picture perplexing and wholly unexpected, — a quaint oak chair, an old hand, a worn black coat-sleeve resting on the arm of the chair, — slowly recognized as a recollection of a room in a country vicarage, which I had not entered and but seldom recalled since I was a child of ten. But whence came this vision? What association has conjured up this picture? What have I done to-day? . . . At length the clew is found. I have to-day been reading Dante, first enjoyed with the help of our dear old vicar many a year ago." After these instances (and there are many more in some of which the crystal is purposely resorted to, and often successfully, to see if there be any unconscious information regarding the whereabouts of a missing prescription or a lost key), we may agree with the writer, that "one result of crystal-gazing is to teach one to abjure the verb 'to forget' in all its moods and tenses."

Examples of the objectification of recent sensations are given, but the point is clear enough without instances. Although the author regards recent impressions as a less important element of her dream life and her visualizations than older experiences, she can none the less create a group of figures, and put them in the crystal to see what they will do; "and so far is one's conscious a stranger to one's unconscious Ego, that I sometimes find their little drama so startling and unexpected that I watch the scene with curiosity and surprise." One more instance may be added. The author wanted the date of Ptolemy Philadelphus, felt sure that she knew it and connected it with some important event, but could not recall it. The crystal showed her an old man, "dressed like a Lyceum Shylock," and writing on a big book with massive clasps. Wondering who he was, she decided to carry out a suggestion, and look at the image through a magnifying-glass. The glass revealed the characters as Greek, though the only characters recognized were the numerals "LXX." Then it flashed on my mind that he was one of the Jewish elders at work on the Septuagint, and that its date, 277 B.C., would serve equally well for Ptolemy Philadelphus. It may be worth while to add, though the fact was not in my conscious memory at the moment, that I had once learned a chronology on a mnemonic system which substituted letters for figures, and that the *memoria technica* for this date was, "Now Jewish elders indite a Greek copy."

Our author adds a possible third class of crystal-visions, concerning which she speaks with becoming caution and uncertainty; namely, those that may be connected with telepathy, clairvoyance, and other doubtful faculties. It is true that historically this use of crystal-vision is the most important; and, if we could credit the evidence of wonderful facts revealed by this means, we would indeed have to call in other means of explanation than those science affords. But the methods of using this form of vision for purposes of more or less conscious deception are so various, and lie so close at hand (indeed, our author cites some pertinent cases in which prophetic powers ascribed, alleged to a crystal-seer, were shown to be groundless by the exercise of very ordinary precautions), that we need hardly have recourse to untoward hypotheses as yet. As is well remarked, "it is easy to see how visions of this kind, occurring in the age of superstition, almost irresistibly suggested the theory of spirit-visitation. The percipient, receiving information which he did not recognize as already in his own mind, would inevitably suppose it to be derived from some invisible and unknown source external to himself." A large class of prophecies, too, aid in their own fulfilment; and, in brief, this aspect of the topic presents nothing peculiar to itself, and may be dismissed with the mention of it already made.

We have illustrated in this study the subtlety of the relation between the conscious and the unconscious mental processes. We see what a small proportion of the endless impressions that stream

in upon us through the avenues of sense are consciously added to our mental storehouse, and what a very much larger portion must be at the service of those lower strata of consciousness that at times rise so unexpectedly and so mysteriously into the focus of attention. And finally, just as much of the mystery that surrounded the mesmeric phenomena fell away when men looked for their explanation, not in some peculiar gift of the mesmerist, but in the psychophysic constitution of the subject, so the phenomena connected with crystal-vision become psychologically rational when we seek their explanation, not in the magic properties of the crystal, but in the mind of the seer.

NOTES AND NEWS.

THE American Institute Fair in this city, which will close in a few weeks, is well worth a visit from any person interested in the progress made from year to year in applied science. The electrical and mechanical exhibits are especially good.

— The will of Henry J. Steere, one of the wealthiest men in Providence, who died recently, gives away directly and in trust the sum total of \$1,139,000. The Rhode Island Historical Society gets \$10,000; the Tabor College in Iowa, \$50,000; and Roanoke College at Salem, Va., \$25,000.

— Dr. Frank S. Billings, late in charge of the patho-biological laboratory of the State University of Nebraska, has removed to Chicago, Ill., to resume the study of the non-recurrent diseases of children, — scarlet-fever, mumps, measles, and whooping-cough. Dr. Billings has fitted up a laboratory at 3600 Michigan Avenue, in which he proposes to prepare virus for the inoculation of swine against hog cholera, and to continue the study of that subject. The importance of such a laboratory to the stock-breeders of the country may be great.

— Leo Lesquereux, the Nestor of botanists in the United States and a well-known student of paleontology, died recently at his home in Columbus, O., at the age of eighty-two. Lesquereux was born at Fleurier, near Neufchâtel, in 1806. He was educated in Neufchâtel, and later occupied chairs at several European educational institutions. At twenty-five he became totally deaf. In 1848 he came to this country, influenced to this step by Agassiz. His works on the mosses of North America in conjunction with Mr. James, and on the fossil botany of the same region, are perhaps the best known.

— Mr. Henry O. Avery, in a letter to *Building* on the efflorescence on bricks, says, "During a recent trip abroad, I noticed in several countries a common occurrence of exuding salts on the surface of brick constructions. On questioning several foreign architects about the cause and remedy, there seemed to be a variety of opinions, and from the seeming contradictions I will note down some: 1. Sulphate of magnesia, due to the presence of iron pyrites (sulphide of iron) in the clay. The action of sulphurous acid generated in the combustion of bituminous coal on the magnesia in the clay changes the pyrites to a sulphate of magnesia. 2. Carbonate of soda, probably caused by the lime of the mortar acting upon a silicate of soda in the brick. 3. Carbonate of lime, formed by the leaching of lime from mortar, carbonated by the carbonic acid in the air. 4. Silicate of soda, caused by using salt clay taken near the sea. There is a common theory that the trouble is mostly due to the action of mortar and the brick together; yet the 'Epsom salts' have been known to appear in ornamental parapet walls where there was no mortar, cement, or grouting of any kind. Some say that bricks burned with wood-fire were exempt from the nuisance, but historical architectural records of Boston speak of 'white saline coatings' one hundred years ago, when wood only was used for burning bricks. As to remedies, several are mentioned. The commonest is water and muriatic acid; but this does not always decompose the sulphate of soda, and will not prevent it exuding again. Oil in mortar, carefully laid, is supposed to prevent 'salt-petring,' one gallon to a cask of lime, or two if cement is used; but this has failed as often as it has succeeded. English architects quite frequently employ a solution of fatty matter, quicklime, and cement-powder; and the French and Swiss masons, a mortar

paste of bone or marble dust, with sand and coloring-matter, used sparingly. For surface treatment, a coat of boiled linseed-oil is often effectual, though sometimes insufficient. An impervious oily varnish is used by many. The backs of bricks have been covered with hot pitch; and in England a preparation called 'Duresco' is used, either transparent or colored, and is said not to peel off. An invention patented consists in placing tarred felt between the face pressed brick and the common brick behind, leaving cavities in the top and bottom flat sides of the front bricks, and connecting them to the common brick backing by pieces of galvanized sheet-iron, punctured to roughen them, and laid between the flat joints of the brick; but this, besides being expensive, has failed repeatedly. In the presence of all these theories, as to cause, effect, and remedy, are we not to conclude that there is no remedy but to wait? The coating is soluble, and is washed off by the rains, and will in time disappear."

— President E. Benjamin Andrews of Brown University is desirous of adding a department of law and applied science to Brown. There will hereafter be an elective course in law for the seniors in the second term beginning this year. As to the prospect of establishing a school of applied science, he says it is not so much a prospect as a hope. Half a million of dollars will be required.

— The following report by Mr. C. L. Calloway, chief officer of the American steamship "Santiago" (Capt. Allen), relative to a waterspout off the Bahamas last April, is one of the best that has been received at the United States Hydrographic Office. One feature of special interest is the fact that the water that fell from the spout was salt water. Although it seems probable that such is often the case, yet there are very few, if any, good observations regarding it, and it is a question of considerable importance relative to the formation of a waterspout. Mr. Calloway reports as follows: "On the 29th day of April, 1889, at about 6.30 A.M., Royal Island (one of the Bahamas) bore about south, distant four miles. The wind was light, from the south-south-east, and the weather partly cloudy. I observed a waterspout forming off the starboard bow (ship heading south-west), and moving in the direction of the steamer at an angle of three points. On account of its close proximity, I was about to steer clear of it, when I observed it breaking, about thirty yards from the ship. Immediately afterwards the steamer passed through the outer edge of the whirlpool, the diameter of which I should judge to have been about fifty to seventy yards. On passing through the outer edge, I observed that the centre was hollow, the water circling from west to east, or against the sun. The water that fell on deck was very salt, and the drops as large as a fifty-cent piece. During the few seconds of our passage through it, the wind blew at the rate of about thirty or thirty-five miles per hour. I did not observe any calm in the centre at all, the water arising from it resembling an inverted fountain. After clearing it, the wind resumed its original force, about fifteen miles per hour. Being the officer of the watch, I had little time to observe the barometer, but it fluctuated one or two hundredths, and then resumed its previous reading. The appearance of the clouds above and around the spout were very ragged and much disturbed, similar to those in a thunder-storm. Their motions were very rapid, ascending, descending, and breaking away from each other after the water had been absorbed into them. The water was whirling very rapidly for several minutes after the break, showing what tremendous circular force there must have been. I may mention, that, upon passing through it, the steering of the ship was not affected, so that if there were any current at all it must have been circular, and confined to the centre." Such reports are of very great interest, and, whenever possible, sketches should be made to illustrate the waterspout at various stages of its formation. The blank form issued by the Hydrographic Office contains a full statement of the items of greatest importance in this connection.

— Gen. M. C. Meigs has had a new edition of the population discussion printed, combining in one sheet the two letters to *Science*, and showing all the results, details, and rates or ratios or percentages, in one table. The article has been noticed by a good many papers, generally with the idea, which is natural, that the author is an optimist. The figures are so great as to startle those to

whom they come for the first time. They startled Gen. Meigs. But they are the results of a law of nature and of the environment of the subjects. We may have a great war, but there is no visible occasion for it. Epidemics and pestilences cannot commit such ravage, now that medical and sanitary science are so advanced, as they did in old times of comparative ignorance; and, until the soil is overtaxed for food, about the rate of annual increase of the last two hundred and forty years must, Gen. Meigs thinks, continue without much change. Doubtless a time will come when the causes which have checked the growth of the French will act upon us, but it seems to be distant at present. England doubled her population between 1800 and 1840; Europe added only 77 per cent to hers from 1830 to 1880; we in that time multiplied ourselves by four.

— Professor F. H. Snow has been appointed acting president of Kansas State University. The *American Geologist* points out that four of the Western States have for presidents of their universities men whose professional training and labor had been scientific: Indiana has D. S. Jordan, an ichthyologist; Wisconsin has T. C. Chamberlin, a geologist; Iowa has C. A. Schaeffer, a chemist; and Kansas now has F. H. Snow, a geologist.

— The matter which arouses the Chinaman to pray with most energy, according to the *Missionary Herald*, is drought or the near prospect of famine; but when he so prays, it is not in solemn or thoughtful ways, but by clanging cymbals and the noise of fire-crackers and the utmost confusion. The *Missionary Herald* of the English Baptist Society contains a report from one of their missionaries in Shansi concerning a great assembly held to pray for rain, and of the day of thanksgiving which followed after the rain fell. Buddhist and Taoist priests were together in their robes, and four holy (?) men were drawn from their retreats in the mountains, and were "stripped to the waist, and bore huge spiked iron collars around their necks and carried their arms stretched out before them with knives run through their flesh." The uproar was maddening. This was their mode of thanksgiving. The story is told of a mandarin who felt great responsibility for the drought which was afflicting his district, and came to a certain well at Han Tau; and, prostrating himself, he cried, "If rain does not come, I will jump into the well!" And this he did at once. Afterwards, as the story goes, rain fell, and the people regarded it as the result of the very meritorious suicide of this man. The emperor, in order to celebrate such a glorious deed, ordered a tablet of gold to be placed in a shrine around the well, on which this man's name and heroic act were recorded. The well is famous to this day, and it is believed that prayers offered there are sure of an answer. The place is covered with thank-offerings of the people, and the tablets which testify to the virtues of the shrine quite cover up the tablet originally placed there in honor of the official who killed himself.

— The house of a Hindoo of good position is divided into two parts. The zenana is that portion of it which is occupied by the women. It is generally situated towards the back of the house. In the centre of it there is an open court twenty or thirty feet square. This is surrounded by a veranda. In the inner or back wall of the veranda you see here and there all round small doors. These conduct to the private apartments of the women. As the custom in India is for young men, when they get married, not to leave their father's house and set up separate establishments of their own, but to bring their wives into their father's house, a goodly number of women may sometimes be found in the same family. These may all meet together in the open court. Should the husband of one of the ladies of the zenana wish to enter, says *The Missionary*, he must first give notice of his approach, either by knocking or by a loud cough. The ladies at once draw their chudders over their faces, and make a rush for their separate apartments. This small court is the only place in which a zenana lady is allowed into the open air, if open air it may be called. When she has reason to go beyond the walls of the zenana, she is either carried in a close paliki or conveyed in a bullock-cart, which, of course, is curtained all round. Should she require to walk a few steps, a large sheet is thrown over her, so that no one may see her.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....\$3.50 a year.

Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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MEETING OF THE INTERNATIONAL CONGRESS OF
ZOÖLOGISTS AT PARIS, AUG. 5-11, 1889.

THIS was the first general gathering of zoölogists from nearly all the countries of the Old and New World, and was one of the many notable congresses called into being on the occasion of the Universal Exposition of 1889. It should be said that the initiative was taken by the Société Zoologique de France. The sessions were held from the 5th to the 11th of August, under the presidency of Professor Alphonse Milne-Edwards. The opening meeting for organization was held on the afternoon of Aug. 5, and was largely attended. Among the more distinguished *savants* present were the venerable De Quatrefages, Retzius of Stockholm, Topinard, Rüttimeyer of Basel, Hubrecht of Utrecht, Fritsch of Prague, besides well-known naturalists from Belgium, Moscow, Kiew, Budapest, Prague, Berlin, London, Geneva, Cairo, Malta, Algeria, southern France, Scotland, Ireland, Cape Town, and the United States. Papers were read by scientists of all nationalities; so that the meeting was truly cosmopolitan in its nature, though, naturally enough, French was the language in which the papers were read. Here it might be observed, that, though many of the papers were presented by foreigners, but few of the speakers used notes or manuscript; and we were, on the whole, struck with the fluency, readiness, and elegance of diction, and the lack of hesitation, clumsiness, and verbosity. The audience consisted mainly of experts; and the papers, with the ensuing discussions—in fact, all the work of the congress was performed, as an American would

say, in a thoroughly business-like manner. The sessions began promptly at 9 o'clock, and adjourned at noon. The afternoons were devoted to visits to the new and commodious museum building in the Jardin des Plantes, the Ecole des Mines, to portions of the exposition of special interest to the members, where, among other attractions, the Prince of Monaco exhibited his dredging and other apparatus for deep-sea research. Private collections were thrown open to individual members; private hospitality shown at the noon hour for breakfast, in France, as well as at dinner-time; while on three of the evenings the members attended the delightful *soirées* at the houses of Professor Milne-Edwards, of Prince Roland Bonaparte, and M. Certes, inspector-general of finances; and on other evenings they mingled with the host of *savants*, teachers, and students at the notable *soirées* given by M. Guyot, the minister of public works, and the colossal reception at the Hotel de Ville given by the municipality of Paris.

To return to more prosaic matters: one of the principal topics discussed in the meetings, and which was especially considered in the opening presidential address, was deep-sea explorations, while most of the papers were of a general nature, giving methods and results. The special topics for discussion, and which were announced beforehand, the reports being in print and distributed at the meetings, were the following: 1. The rules to be adopted for the nomenclature of organized beings; the adoption of an international scientific language (reporter, Dr. R. Blanchard). 2. Determination of the regions of the globe of which the fauna is insufficiently known, and which need exploration; indications of the method of research, of the preparation and preservation of animals (reporter, Dr. P. Fischer). 3. The services rendered by embryology to the classification of animals (reporter, Professor E. Perrier). 4. The relations which exist between the existing and fossil faunæ (reporter, Dr. Filhol).

The discussion on nomenclature was not introduced until the last days of the session. The report of Professor Blanchard was conservative, excellent, and generally accepted by those present, and should be widely disseminated; the law of priority was adopted, beginning with the year 1722, the date of publication of Lang's work; while little approbation was given by the congress to trinomial nomenclature, although the report favored it in special cases.

The idea of such congresses, it seems to us, was a happy conception; and so successful were its results, that, we were told by Professor Milne-Edwards, another will be called in three years. The great value of such international gatherings to a foreigner is the stimulus and pleasure resulting from meeting distinguished workers in other than his own narrow specialty, the friendships formed, the solution of the personal equation so to speak, and the examination of private and public collections and libraries in a metropolis. To an American the occasion was one of great interest and lasting value, and one cannot return to his work without pricking in "some flowers of that he hath learned abroad."

A. S. P.

HEALTH MATTERS.

Electrical Injuries.

AT a meeting of the Practitioners' Society, Oct. 4, 1889, Charles L. Dana, A.M., M.D., of New York, read a paper on the above subject. As he pointed out, with the introduction of new industrial methods we are meeting accidents and injuries of all grades of severity; and in time there will be associated with electrical systems, classes of injuries some of which will be perhaps peculiar to them; some will resemble those known as railway brain and railway spine, traumatic hysteria, and other neuroses or psychoses; while a large number will be only of the ordinary surgical character.

The telegraph and telephone produce peculiar neuroses, due to the demand made upon the nervous system of the operator, the results being telegraphers' cramp, aural and mental disorders of telephone transmitters, etc. Most of the observed cases of this electrical injury come from the apparatus carrying electrical currents for lighting and power.

Such currents have varying effects. In some cases they merely

stun the victim, and burn the parts in contact with the wire; in others they have been known to produce permanent paralytic effects (of such cases, however, there are only two on record); in still other instances almost instantaneous death results; while sometimes a mental shock is produced, which affects the system just as other shocks do, causing conditions known as traumatic hysteria or neurasthenia.

The number of fatal accidents from electrical currents during the past ten years has been variously estimated at from 100 to 200.

The electrical current burns or not, according to the dryness of the skin and clothes and the consequent degree of resistance. With a dry skin there is more burning, less penetration, less shock, and less danger of death. With a wet skin and good connections there is little burning and more serious internal effect. Dr. Biggs has noted that most of the fatal electrical accidents have occurred on or after rainy days.

Dr. William C. Thompson recently reported a curious case of traumatic hysteria. A man, aged fifty, not long ago saw an Italian killed by an electric wire. Two weeks later, while walking along the street, an electric wire which had just been cut fell, and struck his head. He grasped it in his hand, and fell down. He says that he knew nothing until a few hours later, when he found himself in the hospital. He then had right hemiplegia and hemianæsthesia, including the senses of smell and taste. There was limitation of the visual and auditory fields, bone deafness, pharyngeal anæsthesia, and all the stigmata of typical hysteria. The wire which struck him was a "dead" one; and the blow was slight, and caused no contusion.

The fact is, that the practical introduction of electricity has been attended with much less fatality than that caused by gas, steam, railroads, and many other of the inventions of modern life. For example: in France, among 223,000 railway employees, there is an annual average of 239.5 killed and 1,850.4 wounded; in Germany there are 1.35 per 1,000 of railway-servants killed, and 3.09 per 1,000 wounded; in England the annual mortality is 2.43 per cent; in the United States among 418,957 employees, in 1880, there were 923 killed and 3,617 injured, — a higher rate than anywhere in Europe (United States Census). In coal-mining the ratio in France is 1.56 per 1,000 of killed, 8.87 per 1,000 of wounded.

Some of the points which Dr. Dana wished to make in the article, which is published in full in *The Medical Record*, are, the extraordinary increase now going on in the practical application of electricity, there being already nearly \$100,000,000 invested in lights and power alone; a practically new class of injuries met in connection with the new industries. Such injuries have been heretofore produced only by lightning, and they have been consequently rare. These injuries are not numerous or serious as compared with those met with in connection with other great industries. There have been in ten years only about 100 deaths in the whole world from artificial electrical currents. The railroad kills annually over 2,500 people (2,541 in 1880), and injures about 6,000, in the United States alone. Electrical currents produce three kinds of severe accidents: they kill at once; or they burn severely; or, by the mental and physical shock, they cause traumatic neurosis. Usually if they burn severely they do not kill: hence, practically, the rule is, if contact with electrical wires does not kill, the victim gets only a burn or a harmless shock. In very rare cases the current seems to affect the nerves or nerve-centres, causing paralysis. The minimum current safe to receive is not definitely known. Probably eight hundred to one thousand volts of continuous current, and a third less of alternating current, would not be fatal. The wires for lighting and for power carry the more dangerous currents.

THE BEHAVIOR OF THE GERMS OF CHOLERA, TYPHOID-FEVER, AND TUBERCULOSIS IN MILK, BUTTER, WHEY, AND CHEESE. — Among the numerous labors of the Reichsgesundheitsamt has been that of determining the behavior of certain germs of disease in various articles of food. Milk is one of the most common articles of diet; and one of the health-office collaborators, L. Heim of Würzburg, has lately concluded a lengthened inquiry into the relations of the bacilli of tuberculosis, cholera, and typhoid-fever to it, and its products, whey, butter, and cheese. That milk

is a favorite medium for dissemination of disease is well known; and Koch, among others, has shown that it is peculiarly adapted for this purpose. As regards cholera, the germs of the disease were still viable after remaining for six days in milk that had undergone no antisepticizing processes: in milk of the same character that had been kept in the ice-chest, on the other hand, no living bacteria were found at the end of three days. This part of the inquiry shows that cholera bacteria remain active in fresh milk the whole length of time it is customary to keep it, and that they do not lose their dangerous quality for some days after the milk has become sour. The same germs were found active under some circumstances, even at the end of a month. In ordinary strong cheese they did not retain their viability over a day, neither did they in unripe cheese. The bacilli of typhoid were alive and capable of development in milk at the end of thirty-five days, but no longer so at the end of forty-eight days; in butter they remained active between three and four weeks, in cheese only three days, and in whey only during the first day. Tubercle bacilli remained capable of development for ten days in fresh milk; in milk gradually undergoing decomposition they lost their power in a period varying between ten days and four weeks. In butter, on the other hand, they retained their full power at the end of four weeks; in whey and cheese, after two weeks, but not after four weeks. The practical importance of the investigations is so obvious as scarcely to need pointing out; and their bearing on the use of milk, the preservation, carriage, preparation, and sale of it and its products, is equally obvious. Something has been done, much remains to be done, to stop the ravages of disease; and the labors of Dr. Heim are another step forward.

STERILIZED MILK DELIVERED TO PATIENTS IN THEIR DWELLINGS. — Since Aug. 1, sterilized milk has been furnished to children under treatment at the Philadelphia Polyclinic. The milk, says *Medical News*, is sterilized by the Visiting Nurse Society of Philadelphia, and taken to the child by the nurse in attendance, in the bottles in which it is prepared. Milk and bottles are furnished the parents at cost. The results have been excellent.

HEALTH OF NEW YORK AND LONDON COMPARED. — Some interesting points of comparison between the health of London and that of New York are summarized in *The Boston Medical and Surgical Journal*. The deaths in London last year numbered 78,848, or 18.5 per 1,000; in New York, 40,175, or 26.33; and in Paris, 22.6 per 1,000. The birth returns for New York are incomplete; but the birth-rate in London was 30.7 per 1,000; in Paris, 27.0. The male births in Paris were 30,723; the female births, 29,913. In London the numbers were, males, 66,629; females, 64,451; but in the total population of London there is a majority of 250 females. Premature births in New York numbered 1,155; in London, 2,099. To be equal, the figures referring to New York should only be a third. New York compares unfavorably with London in the matter of suicides. There were 247 in New York, and 400 in London. Between 800 and 900 persons take their own lives in Paris every year. In New York 1,138 were killed by accidents; and in London, 2,516. There were only 1,892 deaths from bronchitis in New York, while in London there were 10,085. But while some hundreds die every year in London as the result of idleness and obesity, 61 deaths were recorded last year from starvation. A decreased death-rate is invariably accompanied by a lower birth-rate. The deaths in London last year were the lowest on record; the births, the lowest since 1841. In the western districts, where the wealthy reside, and where the degree of comfort is high, the deaths fell to 16.4, and the births to 25.5; but in the impoverished and overcrowded east, where the poor never get a breath of fresh air, and are huddled together in unhealthy alleys, the deaths rose to 27.2, and the births to 36.5. The people least able to support children are the most prolific; and the higher the degree of social comfort and well-being, the less the increase of population.

MINERAL WATERS. — The Paris correspondent of the *Boston Medical and Surgical Journal* says, that, of the numerous international congresses that have been held in Paris since the opening of the exhibition in May last, there has been none more important or interesting than the Congress of Hydrology, which has just terminated its meetings. The object of this congress was to eluci-

date a certain number of those obscure problems which concern the nature and therapeutic value of mineral waters. One of the most original memoirs produced at the congress was that of Dr. Schlemmer, on microbes and thermal waters. According to the author, there is found a certain number of microbes in these waters; but, far from offering any danger, the microbes of mineral waters seem, on the contrary, to possess beneficial properties. It is thus that in certain springs of Vichy, Chantemesse and Frémont have isolated a micrococcus possessing a most pronounced digestive power on albuminoid alimentary substances, which it transforms into peptones. With the knowledge of this fact, it will be seen that it is impossible to imitate this natural mineral water by the aid of the bicarbonate of soda. No artificial chemical combination would be capable of conferring on a water this micro-organic life, any more than of conferring upon it the electro-dynamism of telluric elaboration. The origin of the gases contained in the mineral waters was well demonstrated by Dr. Labat. He stated that whether they proceed from the air or from watery vapor, or whether they are manifestations of the soil or of volcanoes, the gases do not ordinarily play a preponderating rôle in the curative action of mineral waters. Nevertheless, nitrogen is an agent distinctly sedative and anti-catarrhal; sulphuretted hydrogen, a modifier of the skin and of mucous membranes; carbonic acid, an excitant of the blood-vessels and nerves. It is capable, for instance, of arousing the languishing functions of the digestive mucous membrane.

BOOK-REVIEWS.

The Life-Work of the Author of Uncle Tom's Cabin. By FLO-
RINE THAYER MCCRAY. New York, Funk & Wagnalls. 12°. \$2.

THIS book contains both a biography of Mrs. Stowe and an analysis of her principal works. It is written with the approbation of the Stowe family, who have supplied information on certain points. It contains much that is interesting, and, so far as facts go, gives a fair picture of Mrs. Stowe and her work. But it is marred by an overflow of "gush," which is neither pleasing nor improving to the reader. Mrs. McCray is so enthusiastic over her theme that she can hardly write soberly, even in the most commonplace passages, and some of the most ordinary personages assume in her eyes the character of heroes. Thus, she says that certain sermons on intemperance by Lyman Beecher "shook the world," and that Professor Stowe, on another occasion "spoke eloquently and with magnetic force," and "stood forth a commanding figure upon the arena of the world's advancement." Of course, Mrs. Stowe herself is still more highly lauded. The book is a handsome one, but is marred by bad punctuation and by frequent misspellings, such as "Arabian Knights," "Thomas Carlisle" for "Thomas Carlyle," "Henrick Heine" for "Heinrich Heine," etc. Still the work has an interest from its subject, and also from the sincerity and earnestness of its author.

Hypnotism: Its History and Present Development. By FREDERIK BJÖRNSTRÖM, M.D. Tr. by Baron Nils Posse, M.G. New York, Humboldt Publ. Co. 8°. 75 cents.

THE general aspects and methods of hypnotism may be now regarded as sufficiently well understood to make a detailed review of the contents of a general *résumé* of the subject unnecessary. As, however, the available literature of standard merit in English is small, and much of this is in the way of translations, it may be useful to call attention to the present essay of an eminent Swedish physician, especially as its general accessibility will provide it with a large body of readers. The work is purely expository in character, and offers about as convenient an introduction to the subject as we have in English. The topics are well selected, the points clearly stated, and the whole fairly represents the present status of investigation upon this vexed phenomenon. A general historical introduction is followed by a chapter defining the ordinary hypnotic condition, according to various authorities. The method of hypnotizing and the stages of hypnotism are next interestingly discussed. The so-called "unilateral hypnotism" is needlessly honored with a special chapter, though the physical and the psychical effects of

hypnotism are more satisfactorily treated in succeeding chapters. As is proper, most space is given over to the phenomena of suggestion; in which, however, the selection of cases is not as judicious as it might be, considering the needs of the general reader. The concluding chapters treat of hypnotism as a remedial agent, as a moral remedy, in relation to the law, and, finally, its abuses and dangers. Considering the short space at command, the topics are fairly presented except the last, which concerns itself rather uselessly with Parisian methods of deceiving the credulous. The chief defect of the work, however, lies in its placing too nearly on a par views and theories the evidence for which is still regarded by the most able investigators as very different. This is true of the "hemi-hypnotic" phenomena; but it is still truer of the "mental suggestion," or telepathic experiments, to which entirely too much space is devoted. This somewhat uncritical treatment of the outlying fields of hypnotism is certainly the chief defect of the work. In spite of this, however, the work is a valuable addition to the easily accessible literature of the topic, and can safely be placed in the hands of the general reader, especially if he bring to the reading of it the understanding that the views expressed are partly individual, and partly prematurely positive.

Practical Electric Bell Fitting. By F. C. ALLSOP. London and New York, Spon. 12°. \$1.25.

THIS treatise on the fitting-up of electric bells and the apparatus necessary therefor supplies just the information on the subject that would naturally be needed by the average workman. Beginning with the proper way to join two pieces of wire, it goes carefully through all the ramifications of the subject, explaining, in a manner not easily misunderstood, each step, by means of well-worded text and a sufficient number of illustrations. The author shows that he not only thoroughly understands his subject, but that he knows how to treat it clearly and exhaustively without saying a word too much. Much of the thoroughness of the treatise is due, no doubt, to the manner in which it first appeared, or, rather, to the way in which it grew from that part of it which first appeared. The work was first published as a series of papers in a technical journal, and their favorable reception induced the author to re-issue it in book form, taking the opportunity to revise it according to the light gained by the comment and criticism accorded it in its serial form. Much additional matter was added also, the result of numerous questions addressed to him on the subject from time to time.

The points treated are grouped as follows. The first chapter is devoted to wiring, soldering, and joining wires, and earth connections. This is followed by a chapter on pushes, pulls, contacts, and switches, and another on bells, relays, and indicators. Batteries and the magneto bell have each a chapter devoted to them, followed by one on connecting-up. The last two chapters treat of the localizing of faults and of portable sets of apparatus. The book contains nearly a hundred and fifty explanatory engravings.

Proceedings of the Society for Psychical Research. Pt. XIV. June, 1889. London, Soc. Psych. Research. 8°.

THE varied contents of this issue testify to the vigorous activity of the society in the directions inaugurated in former publications. The most interesting and novel contribution is upon the curious phenomena of crystal-vision, an account of which will appear elsewhere in *Science*. The president's address is very brief, and contains hardly more than a report of progress, with renewed protests against misinterpretation of the society's work. A paper by the late Edmund Gurney, completed by F. W. H. Myers, treats of apparitions occurring soon after death, and in part refers the frequency of such apparitions to the emotional disturbances connected with the decease of a friend, and in part considers the matter as of super-normal significance. It cannot be said that any essential advance is made in the present discussion of cases. Mr. Myers also writes suggestively, though with a disproportion of introduction to thesis, upon the Dæmon of Socrates, explaining this vexed question as the appearance of the unconscious mind of Socrates through the medium of spoken language, just as the subconscious "strata of personality" reveal themselves in automatic writing. In the supplement we have an account of some very heterogeneous

and unsatisfactory experiments in various fields of psychic research made at Pesaro, and a review of a recent German work on hypnotism. The society has decided to collect a library in honor of the late Mr. Gurney, to contain works in the special fields of his labors. A catalogue of the library is appended, and contributions are invited.

AMONG THE PUBLISHERS.

THE J. B. Lippincott Company will soon publish "As You Like It," forming the eighth volume of the new variorum Shakespeare edition, edited by Dr. Horace Howard Furness. This edition of Shakspeare throws much light on these dramas, and gives an interesting compendium of what has been written about them.

—Houghton, Mifflin, & Co. will publish shortly "Standish of Standish," a story of the Plymouth Colony, by Mrs. Jane G. Austin.

—D. Appleton & Co. have nearly ready "Five Thousand Miles in a Sledge—Midwinter's Journey across Siberia," by Lovel F. Gowing; and David A. Wells's new work, "Recent Economic Changes, and their Effect on the Production and Distribution of Wealth and the Well-being of Society."

—Fleming H. Revell, Chicago and New York, publishes this week a series of thirty maps and plans of the entire world as known in Scripture. The series is entitled "Revell's Biblical Wall Atlas," and was prepared by T. Ruddiman Johnson, who has availed himself of the results of the latest geographical research, including the recent surveys of the Palestine Exploration Fund, together with every benefit of the most accurate modern scholarship.

—The next edition of the "Naturalists' Directory" (Boston, S. E. Cassino) will be issued early in 1890. Any list of the names of scientific men that are not already represented in the work will be thankfully received. While the new edition will be as complete as possible in American names, it has been thought best to exclude from the lists of foreign countries the names of all persons who do not reply to the blanks or letters sent them, thus making it a more useful exchange list. Unless a sufficient number of subscribers is received to meet the expense of publication, the book will not be issued.

—The September *Bulletin of the Ohio Agricultural Experiment Station* contains five articles discussing the results of experiments in preventing the injuries of the plum curculio, striped cucumber-beetle, currant-worm, and various other injurious insects, and also an important experiment with remedies for potato-rot. These experiments were carried on by the entomologist and botanist of the station, Clarence M. Weed, and the bulletin is illustrated with numerous original engravings. It will be sent free to any Ohio farmer who requests it. The address of the experiment station is Columbus, O.

—*Babyhood* for November opens up the question of how to meet the increasing demand for intelligent nursery-maids. It is a subject in which all mothers of young children are interested, and the methods proposed by *Babyhood* for raising the standard of nurse-

girls deserves careful consideration. No less important to parents is the warning as to growing pains given by Dr. J. Lewis Smith. "Nursery Cookery," "Nursery Helps and Novelties," may be mentioned among the topics discussed in the current number.

—"Origin and Formation of the Hebrew Scriptures," to be published soon by Lee & Shepard, Boston, is the indicative title of Lorenzo Burge's third volume bearing upon the human family in its origin, and in the general trend of the purposes of its creation, and its relation to the Creator, at the same time interpreting the Scriptures, and explaining their relation with mankind. Mr. Burge's previous works in this line of investigation are "Pre-Glacial Man and the Aryan Race;" and "Aryas, Semites, and Jews; Jehovah and the Christ." In his "Origin and Formation of the Hebrew Scriptures," the author presents the arguments as to when, where, under what circumstances, for what purpose, and by whom, were these Scriptures written, from the records of the eminent Persian nobleman and historian, Nehemiah, for many years governor of Palestine, from B.C. 445. The work includes an appendix containing prophecy sustained in the histories of Egypt, Assyria, and Babylon, and a review of what the author terms "radical views of the Bible." "The Heroes of the Crusades," by Amanda M. Douglas, announced by Lee & Shepard, is a history of the Crusades, and a story of the personal incidents and efforts of the Crusaders themselves.

—The *Harvard Monthly* (Cambridge, Mass.) enters on its fifth year with an appeal for increased support outside the college, because the editors believe that they can give graduates their money's worth. The purely literary side of the magazine is sufficiently known. In addition to this, events have led it more and more into the practical discussion of college questions. The editors purpose henceforth to recognize decisively this part of their field in the two following ways. Heretofore they have accepted nothing shorter than formal articles. In the future, upon any subject which would concern a Harvard graduate or undergraduate as such, they will regularly open their columns to matter such as the *Century* might print under "Open Letters," or the *Nation* under "Correspondence." They will also begin to publish each month, with brief comment, a record of recent events deserving note; not a chronicle of the daily routine, but of whatever changes the daily routine, of college life, including in the latter word every thing from the broader aspects of athletics to the A.B. degree. In gathering the facts, the editors have been promised the aid of President Eliot, so that what information the paper gives will be authentic. All comment will be entirely the editors' own. These two changes will enable graduates at a distance to keep track of developments at Harvard, and so to do intelligent missionary work, and will also give them a better means than in the past of expressing their own views both on student life and on the college government. The editors wish eventually to make the *Monthly* the recognized organ of communication between alumni, members of the governing boards, and undergraduates. The value to the college of such a medium, it seems to them, would be very great. It depends on graduate support, both in subscriptions and in contributions, how quickly and how thoroughly they can accomplish this end.

Publications received at Editor's Office, Oct. 28.—Nov. 2.

- BELL, A. M. Popular Manual of Vocal Physiology and Visible Speech. New York, N. D. C. Hodges and E. S. Werner; London, Triibner. 59 p. 16°. 50 cents.
- CORSON, H. An Introduction to the Study of Shakespeare. Boston, Heath. 377 p. 12°.
- JURY, The. Vol. I. No. 1. w. Rochester, N.Y. W. M. Butler. 18 p. 4°. \$2 per year.
- MCCRAY, Florine Thayer. The Life-Work of the Author of Uncle Tom's Cabin. New York and London, Funk & Wagnalls. 440 p. 12°. \$2.
- MYERS, P. V. N. Ancient History for Colleges and High Schools. Part I. The Eastern Nations and Greece. Boston, Ginn. 369 p. 12°. \$1.10.

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THE CENTURY MAGAZINE



JOSEPH JEFFERSON.

Enters upon a new volume with the issue of November, which contains the opening parts of several leading features of the year. In this number are the first chapters of the "Autobiography of Joseph Jefferson." In it the author relates the story of his life, from his first appearance on the stage as "property" baby, to within the past few years. His reminiscences and the portraits of actors and actresses with whom he has been associated — among them the elder Booth, the Wallacks, Forrest, and Charlotte Cushman — are especially interesting. His own experiences in the pioneer West, in Mexico, Australia, South America, England, France, and the Southern and Eastern States, are related in a frank and charming manner. Mr. Jefferson writes as naturally as he acts. Serial stories by Frank R. Stockton and Amelia E. Barr also begin in the November number. Mr. Stockton humorously describes the extraordinary cruise of *The Merry Chanter*. Mrs. Barr, the author of "Jan Vedder's Wife," etc., has written for THE CENTURY a story of love in the days of Cromwell and the Merry Monarch, entitled "Friend Olivia."

During the year there will be printed other serials and a number of short stores by such well-known writers as Arlo Bates, H. S. Edwards, Sarah Orne Jewett, Richard M. Johnston, Octave Thanet, H. H. Boyesen, and others. The first of the "Present-Day Papers" is printed in the November CENTURY. These are a series of discussions of timely social questions by prominent men who have associated for this purpose, among them Bishop Potter and the Hon. Seth Low, the new President of Columbia College. In December will begin the series by Prof. Fisher, of Yale, on the "Nature and Method of Revelation." During the year will be published popular science papers by Prof. Holden, describing the latest discoveries in astronomy at the Lick Observatory and illustrated articles on "Pre-historic America," by Prof. Putnam, of Harvard. A number of papers on Art will also be printed. In the November number will be found "A Connecticut Yankee at King Arthur's Court," a new story by Mark Twain; a description of the Grolier Club, by Brander Matthews; poems by Walt. Whitman, T. W. Higginson, Margaret Deland, and others.

THE CENTURY costs \$4.00 a year. Subscriptions are taken by booksellers and postmasters, or remittance may be made by check, money-order, or in registered letter, direct to the publishers, THE CENTURY CO., 33 East 17th Street, New York.

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NO INCREASE IN PRICE.

Subscription price as heretofore, \$3.00 a year; 25 cents a number. November begins the volume. New subscribers should commence with that issue. Booksellers and postmasters take subscriptions, or remittance may be made, by check, draft, money or express-order, or in registered letter, to the publishers,

THE CENTURY CO., 33 East 17th St., New York.

— E. & F. N. Spon announce as in preparation, "Practical Electrics," a universal handybook on every-day electrical matters, including connections, alarms, batteries, coils, dynamo-machines, motors, phonographs, telephones, etc., reprinted from the third series of "Workshop Receipts;" "Treatise on Evaporation by the Multiple System in Vacuum, its Construction and Working in Sugar Factories," by James Foster; "Experimental Science: Treatise on the Various Topics of Physics in a Popular and Practical Way," by George M. Hopkins; "The Steam Engine and the Indicator," by William B. Le Van; and "A Practical Treatise on Mine Engineering," by G. C. Greenwell, F.G.S., third edition, reprinted from the second.

— The eighth edition is in preparation, to be ready in January, of "The Electrician," electrical trades' directory and handbook for 1890 (corrected to December, 1889). This will contain a carefully compiled list of British, colonial, and foreign electricians, electrical engineers, electric-light engineers and contractors, electrical-apparatus makers, electric-bell makers and fitters, electric-light, telegraph, and telephone companies, electric-light, telegraph, and telephone engineers, wire makers and drawers, and of all persons engaged in electrical pursuits throughout the world; useful tables relating to dynamos, arc and incandescent lamps, batteries, etc.; and a biographical section, giving interesting particulars concerning eminent men connected with electricity in all its applications, with portraits. Full particulars will be sent immediately on application to "The Electrician" Office, 1 Salisbury Court, Fleet Street, London, E.C.

— D. C. Heath & Co. of Boston have issued "An Introduction to the Study of Shakespeare," by Hiram Corson. It does not cover all the ground that an introduction ought to cover, for it gives no account of the dramatist's life, nor of the state of the English drama in his time; and many other points necessary to a thorough understanding of Shakespeare are left unnoticed. Still it presents a good deal of matter in a concise though not very artistic style. There is quite an elaborate discussion of Shakespeare's verse, and many pages of textual criticism, the latter of which seems hardly appropriate in an introductory work. But the greater part of the book is taken up with literary criticisms on certain of the plays, — "Romeo and Juliet," "Macbeth," "Hamlet," and others. In these criticisms Professor Corson expresses strong dissent on certain points from the views of Coleridge and the German critics; but we have no space to discuss the questions thus raised, and must refer the interested reader to the book itself.

— The division of ornithology and mammalogy of the United States Department of Agriculture is engaged in mapping the geographical distribution of birds and mammals, in addition to the study of their economic relations. The purpose of this work is to ascertain the boundaries of the natural faunal areas of North America. The original information on which the maps are based is collected mainly by the special field agents employed by the division. A smaller portion is contributed by voluntary observers. In the progress of the work many new facts are obtained which ought to be put on record for the benefit of other workers in this department of science. It is not unusual to find new species in the collections made by the field agents of the division, and such species must be named and assigned their proper systematic position before they can be discussed intelligently. It is evident that the results of the investigations of the division are of importance to two distinct classes of readers, — farmers and naturalists. It is deemed desirable, therefore, to publish such of the results as are of use mainly to those engaged in scientific research separately from those of a more purely economic character. The publication of the economic material being already provided for (and appearing as bulletins and reports), it has been decided to publish a series of faunal papers, under the title "North American Fauna." This publication will contain, in addition to the faunal papers proper, such technical matter as results from the study of the material collected, or as may be necessary to an intelligent understanding of the reports which follow. No attempt will be made to issue the separate numbers at regular intervals, but each number will bear date of actual publication. The first of the series is "A Preliminary Revision of

the North American Pocket Mice" (genera *Perognathus* et *Crice-todipus* auct.), with descriptions of new species and subspecies, and a key to the known forms, by Dr. C. Hart Merriam. This contribution toward a revision of the North American pocket-mice is the outgrowth of a recent attempt to identify a large number of specimens for the purpose of mapping their geographical distribution. The results are wholly unexpected. Only six species were previously recognized. This number is here increased to eighteen. Three subspecies also are described, and several well-known names are shifted to forms other than those to which they have been heretofore commonly applied. The present revision of the group is by no means exhaustive: it is intended merely as a foundation for future study.

LETTERS TO THE EDITOR.

*.*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

The Various Discoveries of Lake Mistassini.

IN being persistently discovered, the now unmythical Lake Mistassini has a record not surpassed by the "true" source of the Mississippi. If the lake in question were some recent upstart, grovelling in quaternary detritus, one might pardon such unseemly conduct; but a severed body of water, quietly slumbering in Archæan rocks, has a right to resent such intrusions on its privacy. Furthermore, it is a sacred lake, dedicated to the Great Spirit; for on its bank, one historian informs us, there were found "*autre curieux de marbre d'environ 30 à 35 pieds en quaré; sa route est de 8 à 9 pieds de haut. Les sauvages l'appellent Tchichi Manitou Quitchonap, la maison du Grand Esprit*" (sic).

Its first discovery, more than two hundred years ago, is forgotten except to the dusty pigeon-holes of the Department of Crown Lands. Its last gestation required the combined services of half a score of explorers and a great metropolitan journal to exploit it. In the mean time, still another journal which is daily read by more than a quarter of a million of people was frantically demanding to be informed whether the lake had an actual existence, or whether, like the fountain of perpetual youth, it lay just beyond the end of the rainbow.

Briefly stated, Lake Mistassini was discovered by Father Abanel, a Jesuit, in 1672. It appears on Franquelin's map of New France ("Carte de l'Amerique Septentrionale") under the name of "Lac Timagaming." On this map the shape of the lake is fairly shown, and the long peninsula at the southern end is clearly recognizable. Generally the outlines of the lake, though roughly charted, are tolerable accurate. Franquelin seems to have been a competent topographer, and the slopes and drainage of the country surrounding the lake are reasonably correct. The Heights of Land (*Hauteurs des Terres*), or divide between the St. Lawrence and the Arctic basin, are correctly charted. The outlet of the lake, Rupert River, is followed to Baye du Nord, now called "James Bay." On his map there appears a lake much larger than Lake Mistassini lying to the south-west. This, in all probability, is Lac St. Jean of Père Laure's map; it is, however, greatly exaggerated.

Père Laure, a Jesuit missionary who explored the region about fifty years afterwards, was a man of far more than ordinary ability. He may not have been a trained surveyor, but his keen perception and faithful work more than balance any lacking in that direction. He explored and mapped a large part of the region between the Gulf of St. Lawrence and James Bay, and his manuscript map is now in the archives of the minister of marine, in Paris. The map herewith presented is reproduced from a tracing of a portion of the original. As late as 1866, a reproduction of this map appears in a work by Father Charlevoix. Still more recently, the "Atlas de Géographie Militaire," compiled for the Military Academy at San Cyr, contains a map of a part of the Dominion of Canada, evidently edited from Father Laure's map.

Less than ten years since, Lake Mistassini was again ruthlessly disturbed by a discovery. This time its dimensions were enlarged

until it surpassed Lake Superior in size. In 1884 Mr. John Bignall of the Geological and Natural History Survey was ordered to complete an unfinished survey of the lake; and his work, essentially finished, appears in the report of Mr. A. P. Low, also of the Geological Survey. A carefully reduced copy of Mr. Bignall's map is herewith presented; some of the details, however, having been omitted for want of space. A casual inspection shows that not only is Lake Mistassini insignificant compared to Lake Superior, but also that it is not comparable even to Lake Ontario in size. In examining the maps of Mr. Bignall and Father Laure side by side, the differences are not so great as one might imagine. The salient features are alike in both, and the one is easily reducible to the other. The foreshortening in the latter probably arose from placing too much reliance on the appearance to the eye. Every topographer who has plotted a similarly shaped object, guided by the eye only, knows that it is extremely difficult to avoid such distortion.

The axis of the lake in Father Laure's map is certainly out of its proper angle; but, if we allow about 30° for variation of the compass, this objection disappears. It is hardly probable that at that early date Father Laure should have any means of estimating the

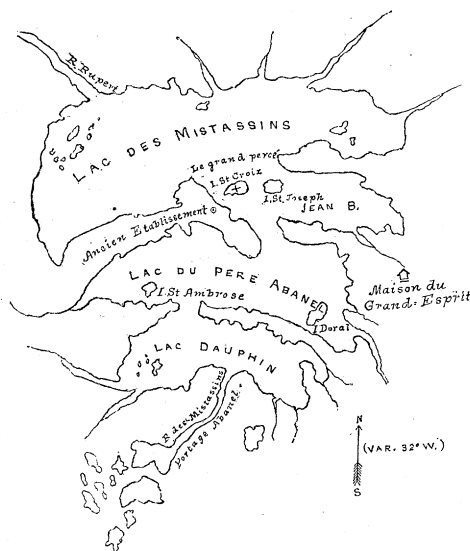
Ptomaines and Leucomaines, and their Relation to Disease.

SEEING the article in *Science* of Oct. 18 induces me to send you this. It was published in a local medical journal (*Pacific Medical Journal*, September, 1889), but I should be glad to give it wider circulation.

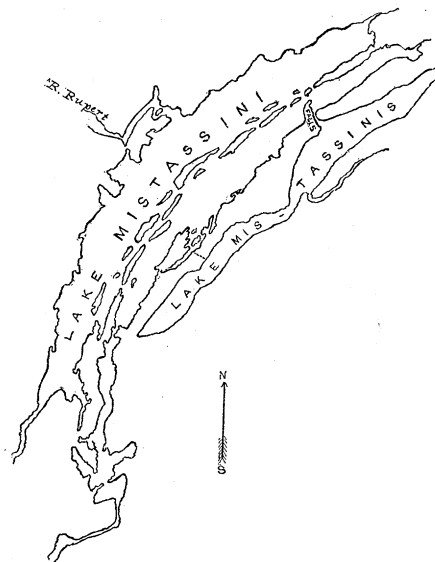
Some recent notices in regard to the composition of leucomaines, and suggestions as to their probable relation to disease (*American Microscopical Journal*, vii. p. 216, 1888; *Science*, xii. p. 335, 1888; *Revue Scientifique*, xliii. p. 187, 1889), have induced me to embody some reflections of my own on this subject.

There is no longer any doubt that the announcement and general acceptance of the germ theory of disease constitute one of the greatest epochs in the history of medicine. But as in the case of all great truths, so in this, the first ideas on the subject have had to be greatly modified: the first extravagant hopes have been disappointed or deferred, and the first claims of its advocates found to be too sweeping.

At first it was imagined that all the grave symptoms of a germ disease, and the death of the patient, were due directly to the presence and multiplication of a specific microbe in the same sense as



Extrait de la Carte du Domaine du Roi en Canada, du Reverend Père Laure, Jésuite, 1731.



Map of Lake Mistassini reproduced from the official surveys of Mr. A. P. Low, Geological Survey of the Dominion of Canada, 1886.

REDUCED COPIES OF THE MAPS OF MR. BIGNALL AND FATHER LAURE.

variation of the compass, or that such a factor should enter into his calculations; so that, on the whole, there are but very few discrepancies between the two maps that cannot be reconciled.

Furthermore, except the direction of the axis, there are no differences between the outlines as shown by the two maps that might not have resulted from the natural erosion of the basin and the corrosion of its outlet. "Rivers," as Gilbert aptly remarks, "are the mortal enemies of lakes;" and it is not reasonable to suppose that Rupert River is an exception to the rule. "Le grand percé" of Father Laure's map has been degraded to a narrow gash, and it is by no means improbable that the level of the water has been considerably lowered by drainage. Indeed, the fall between the adjacent lakes renders such an hypothesis highly probable, for a feature of such importance would not likely have passed Father Laure's notice. Lac Dauphin has disappeared, — possibly from having been drained, — and the long chain of islands traversing the centre of the lake bears further testimony to the lowering of the water in recent times. Unfortunately, Father Laure gives no estimate either of the depth or of the area of the lake, beyond the allusion "d'environ 300 lieues de tour;" so that a comparison of these elements at the two different dates is impossible.

It goes without saying that the lake bears every indication of glacial origin, and the severe winters of the present age cannot fail to leave their traces on the outlines of the lake, even from year to year.

JACQUES W. REDWAY.

the destruction of fruit trees and field-crops is sometimes due to the ravages of insect-pests. The first great modification of this original idea was, that the disease and death in these cases are not due directly to the microbes, but to the accumulation in the blood (or on the mucous surfaces to be absorbed into the blood) of a poisonous chemical substance, a by-product of microbial multiplication. These by-products of albuminoid fermentation (for there are many kinds) have now been isolated from their microbial culture-fluids and analyzed. They may be regarded as alkaloids of albuminoid decompositions, and are called ptomaines. They are most of them deadly poisons. Septic poison, which is the by-product of putrefactive fermentation, i.e., of the multiplication of putrefactive bacillus, is the most familiar example.

The fact of a poisonous by-product of disease-germ multiplication ought to have been anticipated; for every form of fermentation has its peculiar chemical by-product, and many of these are poisonous. The different kinds of alcohol, ethylic, amylic, etc., and different kinds of organic acids, such as lactic, acetic, butyric, etc., are familiar examples. It would be strange indeed if the same were not true of albuminoid fermentations determined by the growth and multiplication of disease germs. As already said, some of these chemical by-products of disease germs have been separated from their generating microbes (as alcohol may be separated from the yeast-plant); and, by the inoculation of these pure chemical products, the corresponding diseases have been produced.

All the symptoms of typhoid-fever and of diphtheria have been thus produced without the presence of any pathogenic microbes. These pure chemical substances have also been successfully used as a vaccine against the corresponding disease, precisely as alcohol is used as a preventive of alcoholic fermentation.

This was indeed a great modification of the original form of the germ theory, but one which only confirmed its truth. We are now probably on the eve of another modification equally important and sweeping. I must explain.

We have seen that ptomaines are alkaloids of albuminoid decomposition generated in the presence and under the guidance of microbian life. Now, there is going on continually in the animal body, as a strictly physiological process, albuminoid decomposition (wasting of the tissues) in the presence and under the guidance of cell life. This also, as might be expected, produces poisonous products. These products also have been isolated and analyzed, and are found to belong to the same class of chemical bodies as the ptomaines. They are alkaloids of albuminoid decomposition, and are therefore in the highest degree poisonous. They are called leucomaines. If they are not also usually deadly to the animal body, it is only because they are continually being eliminated by appropriate organs.

But suppose there should be some change in the process of tissue-waste, and therefore of the composition of the leucomaines, rendering these more poisonous; or suppose, what is still more probable, there be some failure in the function of the organs by which these poisons are normally eliminated: evidently the result would be disease. And not only so, but (mark this) disease similar to those produced by disease germs, except that they would lack the property of contagiousness, because not due to the presence of microbes. Here, then, we would have diseases similar to so-called germ diseases produced without germs. Can we point out any such? Perhaps not yet with any certainty. It is hardly probable that any strongly marked specific and clearly contagious diseases, like small-pox, measles, scarlet-fever, whooping-cough, diphtheria, etc., are ever produced otherwise than by microbes. But it is possible that some of those obscure, sporadic, and apparently non-contagious forms of fever which often run so insensibly into each other, and so puzzle the physician to classify, such as some forms of typhoid, malarial, typho-malarial, continued fever, etc., may be produced in this way. Perhaps, also, countless unclassified, slight fevers and indispositions may come under the same head.

As thus modified, it seems to me that the last remaining objection to the germ theory is removed. But observe: this modification is an abatement of the arrogance of that theory, — is equivalent to an abandonment of its former claims as a universal theory of the cause of disease.

We have said that leucomaines are not usually deadly in their effects on the animal body, only because they are continually eliminated by appropriate organs. What organs? I answer, there may be more than one, but undoubtedly by far the most important is the liver. By careful experiments on animals, Schiff has shown that the liver has the remarkable property of eliminating, or else of decomposing and rendering innocuous to a greater or less degree, all kinds of organic alkaloid poisons, but especially alkaloids of albuminoid decomposition produced by wasting of tissues; i.e., leucomaines. If the vessels of the liver of a dog be ligated so that the venous blood containing these leucomaines cannot pass through that organ, the animal quickly falls into deep lethargy, and in a half-hour dies of blood-poisoning. That death is not the result of mere mutilation, is proved by the fact that a single drop of the blood of a dog dead of ligated liver injected into the veins of a frog will immediately kill the animal if his liver be ligated, but is innocuous if his liver be free (*Archives des Sciences*, lviii. p. 293, 1877).

But the question still remains, "How does the liver eliminate these poisons?" Not directly as such, for they do not appear in the bile. The answer to this weighty question is, I am persuaded, to be found in my interpretation of the glycogenic function of the liver. In my article on this subject, published in 1878 (*American Journal of Science*, xv. p. 99, 1878; also *Western Lancet* for the same year, but I do not remember the number), I maintain that the liver has the power of splitting albuminoids, whether of food or of

waste tissue, into glycogen (which is immediately changed into liver sugar and burned) and a nitrogenous incombustible residue, which is eliminated by the kidneys as urea. Thus leucomaines are rendered innocuous, and at the same time utilized as fuel to maintain vital heat and force by the liver.

But if leucomaines, then also probably ptomaines, produced by microbes may also be disposed of by the liver in the same way, and the patient often saved. If this view be true, then the belief in the pre-eminent importance of the functions of the liver, and the practice based thereon, of clearing the bowels and stimulating the action of the liver in the onset or in the early stages of disease, — a practice reached empirically, and often ridiculed as savoring of routine, — receives ample justification.

JOS. LECONTE.

INDUSTRIAL NOTES.

Storage-Battery Litigation.

THE Electrical Accumulator Company of New York have issued a circular under date of Nov. 1, in which they state that the litigation involving a patent monopoly of the secondary-battery industry has been so prolonged, and is so technical, that it is believed a few words of explanation are appropriate, in order to enable the public to have a clear understanding of the situation.

In March, 1887, suit in equity was commenced in New York by the above-mentioned company, owning the Faure patent, against the Julien Electric Company, designed to stop further infringement of that patent, covering improvements in secondary batteries. During the progress of the suit it became evident that the Faure patent would be sustained, and early in 1888 the Julien Company modified their method of applying the active material to the battery-plates. In March, 1889, Judge Coxe rendered his decision sustaining the Faure patent, and holding that it could be construed to cover any secondary battery having the active material applied to a plate or support in the form of a "paint, paste, or cement." The modified method of the Julien Company accordingly came within the scope of the Faure patent. On April 11, 1889, an injunction was issued restraining the defendants from further acts of infringement. In June the Julien Company petitioned the court for a rehearing of the case; and their factory, which had shut down in April after the injunction was issued, again resumed operations, the method of manufacturing the batteries being again slightly modified; which second modification, it was claimed, did not infringe the Faure patent. Apparently becoming alarmed at the probability that this second modification was also an infringement, the Julien Company devised a third form, and subsequently a fourth form was employed.

In August a new suit in equity was brought against the New York and Harlem Railroad Company and the Julien Electric Traction Company as co-defendants. These parties were using large numbers of these so-called new forms of battery. Motion was made for a preliminary injunction, and in October Judge Lacombe rendered his decision, which, as will be seen after careful perusal, virtually gave the Electrical Accumulator Company all that they asked or claimed. An injunction was issued on Oct. 28, operating to stop the use of all of their four modifications as well as the original form. This decision of Judge Lacombe has been printed for the information of interested parties. It is concise, accurate, and clearly defines what Brush is said to have done in anticipation of Faure's patent.

Quoting from the decision on this point, "What Brush did was to immerse a plate coated with dry material not only into fluid, but into the very fluid in which it was forthwith, and *without removal therefrom*, put to use as a battery plate." It is to be noted, that, under this decision, the manufacture of secondary batteries in any quantity will, if at all possible, be utterly impracticable without infringing Faure's patent.

It has yet to be demonstrated that such form of battery will work outside of the laboratory. It has never been done, although ten years have elapsed since Brush is said to have made the experiment; while manufacturers, both in this country and Europe, have been studying the problem with the strongest incentives to attain success.

CALENDAR OF SOCIETIES.

Biological Society, Washington.

Nov. 2. — C. V. Riley, The Remarkable Increase of *Vedolia cardinalis* in California; W. H. Dall, Notes on the Genus *Gemma* Deshayes; George Marx, On a New Spider and its Influence on Classification; C. Hart Merriam, Remarks on the Spotted Skunks (Genus *Spilogale*), with Descriptions of New Forms.

Boston Society of Natural History.

Nov. 6. — Thomas Dwight, The Joints and Muscles of Contortionists.

Engineers' Club, St. Louis.

Oct. 23. — The secretary read a letter from the chairman of the board of managers of the Association of Engineering Societies, proposing a meeting of the board to consider the question of proposed affiliation with the American Society of Civil Engineers. Professor Johnson stated that this announcement was made for the club's information, in order that an opportunity might be given the club to instruct its members of the board regarding some plan of united action. Mr. H. A. Wheeler then presented some notes regarding the recent European trip of the American engineers. Some three hundred members of the American Society of Civil Engineers, the American Society of Mechan-

ical Engineers, and the Institute of Mining Engineers, took part. Professor Johnson exhibited a test piece of iron which had been welded by the electrical process at the exposition.

Minnesota Academy of Natural Sciences, Minneapolis.

October. — N. H. Winchell, The so-called Huronian Rocks in the Vicinity of Sudbury, Can.; H. V. Winchell, The Iron-bearing Formations of Minnesota; Professor Chaney, Some Remarkable Forms supposed to be of Cryptozoon in the Shakopee Limestone at Northfield; Warren Upham, A Recent Visit to Itasca Lake.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 47 Lafayette Place, New York.]

Morris's "British Butterflies," Morris's "Nests and Eggs of British Birds," Bree's "Birds of Europe" (all colored plates), and other natural history, in exchange for Shakesperiana; either books, pamphlets, engravings, or cuttings. — J. D. Barnett, Box 735, Stratford, Canada.

I have *anodonta of alina* (Weatherby), and many other species of shells from the noted Koshkonong Lake and vicinity, also from Western New York, and fossils from the Marcellus shale of New York, which I would be glad to exchange for specimens of scientific value of any kind. I would also like to correspond with persons interested in the collection, sale, or exchange of Indian relics. — D. E. Williard, Albion Academy, Albion, Wis.

Will exchange "Princeton Review" for 1883, Hugh Miller's works on geology and other scientific works, for back numbers of "The Auk," "American Naturalist," or other scientific periodicals or books. Write. — J. M. Keck, Chardon, Ohio.

"I wish to exchange *Lepidoptera* with parties in the eastern and southern states. I will send western species for those found in other localities." — P. C. Truman, Volga, Brookings Co., Dakota.

Shells and curiosities for marine shells, curiosities or minerals address W. F. Lerch, No. 308 East Fourth St., Davenport, Iowa.

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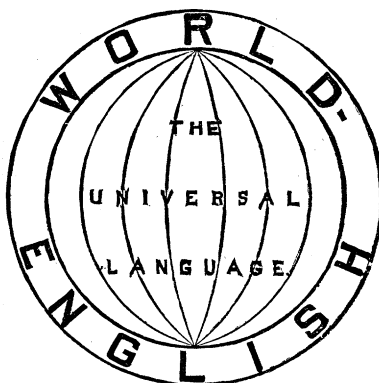
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